

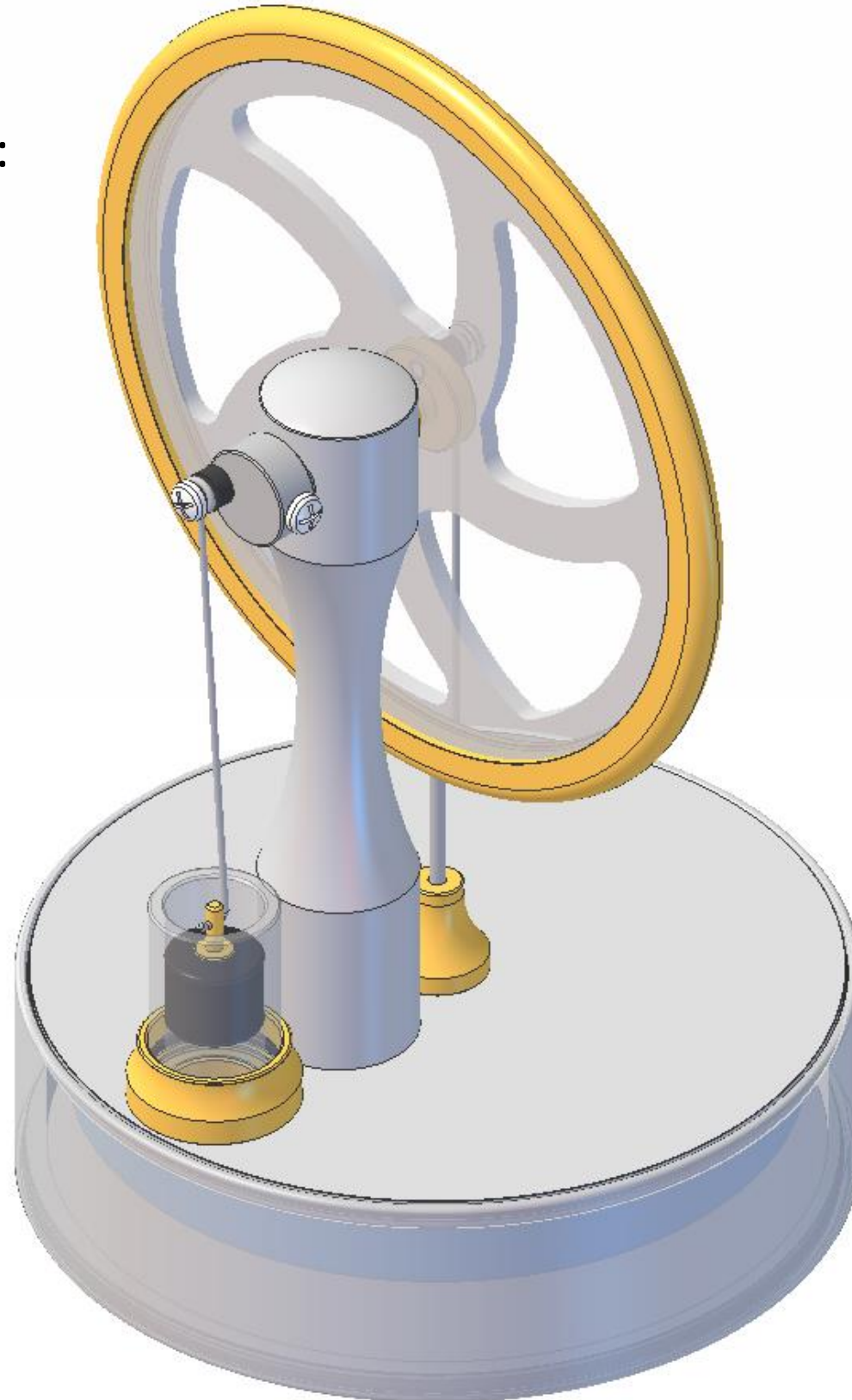
Kontax Stirling Engines KS80 instructions

This document covers the following:

- [Tools required](#)
- [Parts list](#)
- [Assembly instructions](#)
- [Operating instructions](#)
- [Maintenance](#)

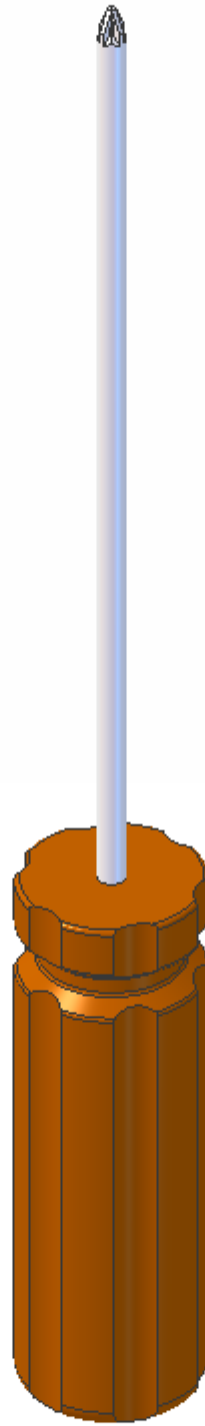
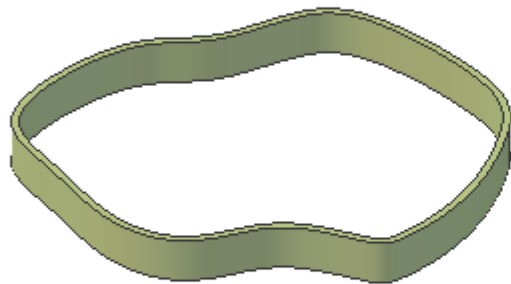
Contact details:

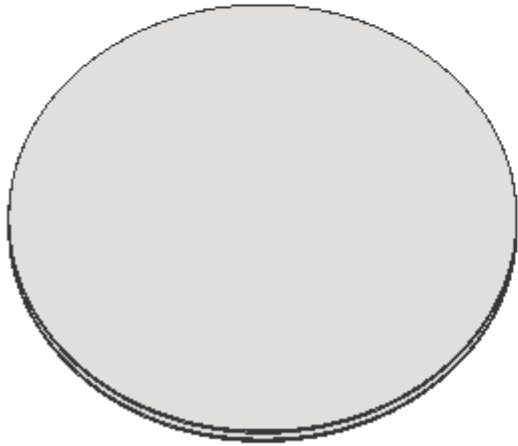
- www.stirlingengine.co.uk
- Kontax@btconnect.com
- Tel: 01452 905001 (UK)



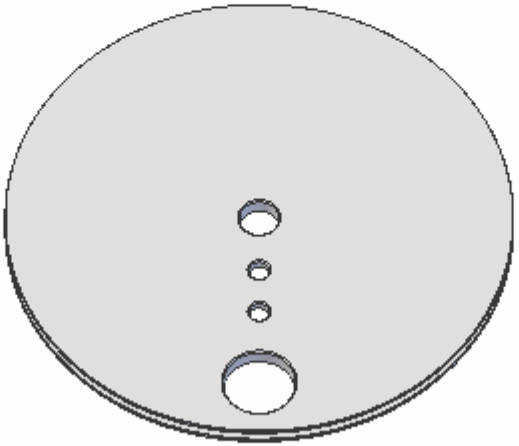
Tools you will need to assemble
your KS80 Low Temperature
Stirling Engine:

Cross-point screwdriver,
Flat-bladed screwdriver,
Elastic band.

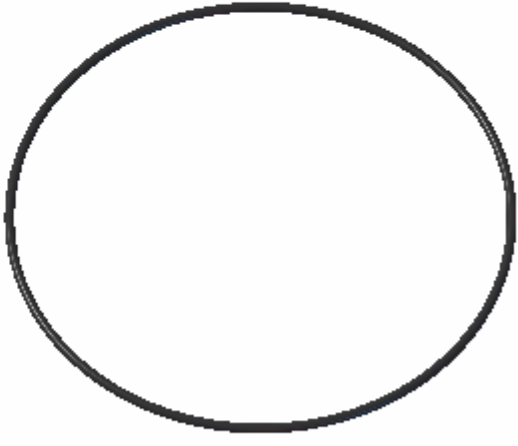




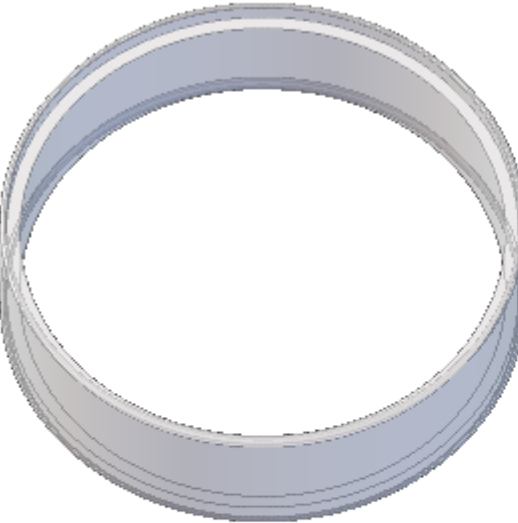
Bottom plate x1



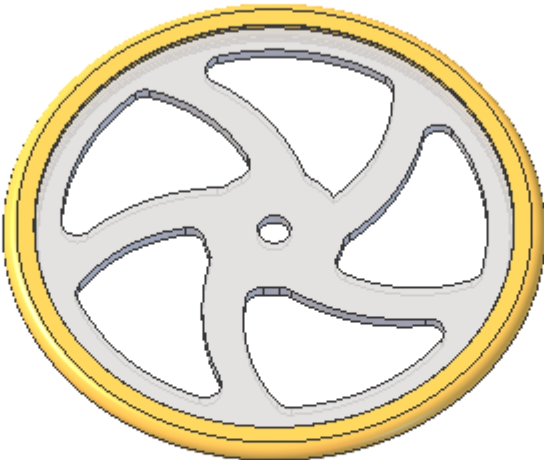
Top plate x1



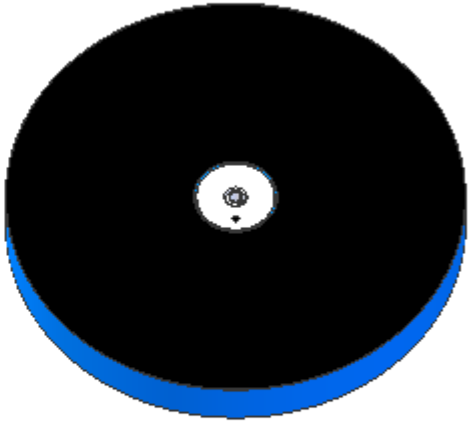
75mm O ring x2



Chamber wall x1



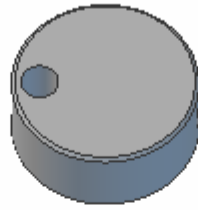
Flywheel x1



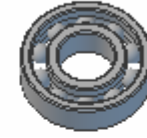
Displacer x1



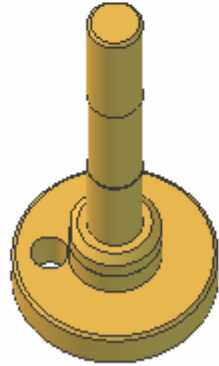
Piston x1



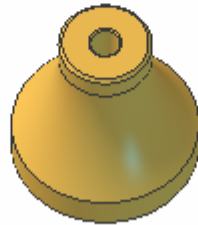
Crank x1



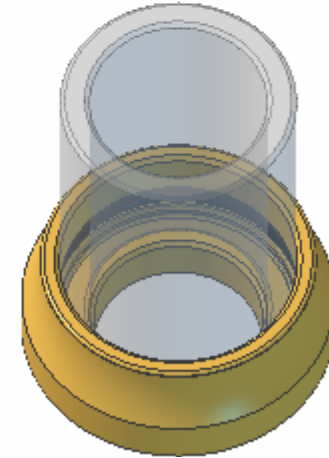
Ball-race bearing x2



Hub/axle x1



Gland x1



Cylinder x1



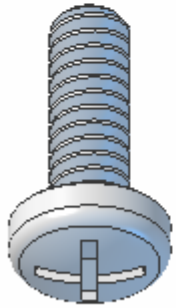
Conrod x2



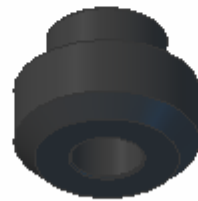
Main pillar x1



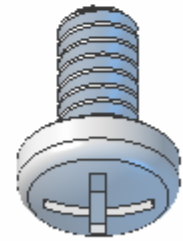
Gland stem x1



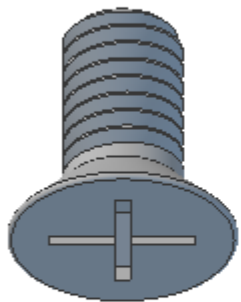
M2x6 roundhead x2



Conrod bush x2



M2x4 roundhead x1



M3x6 countersunk x2

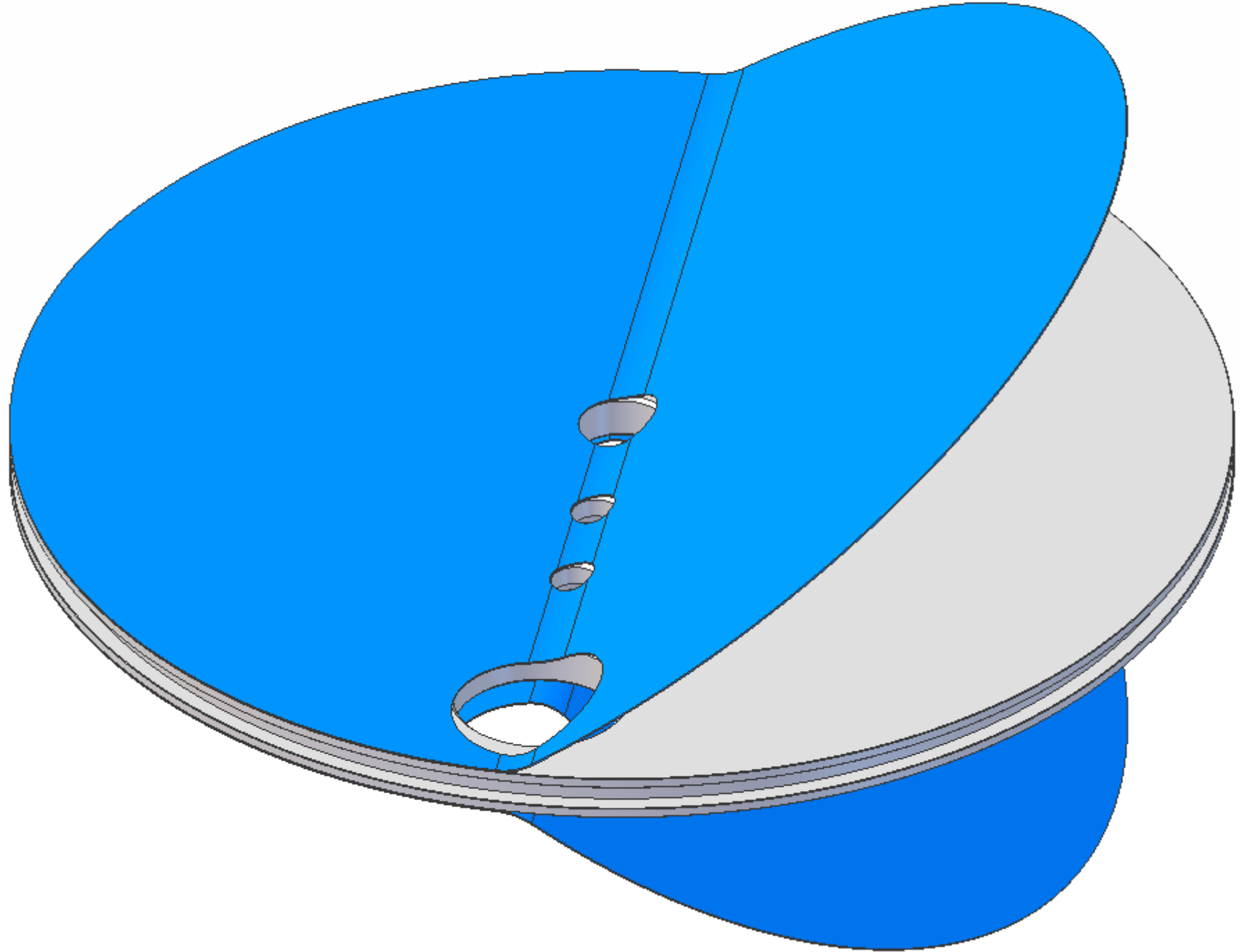


13mm O ring x2

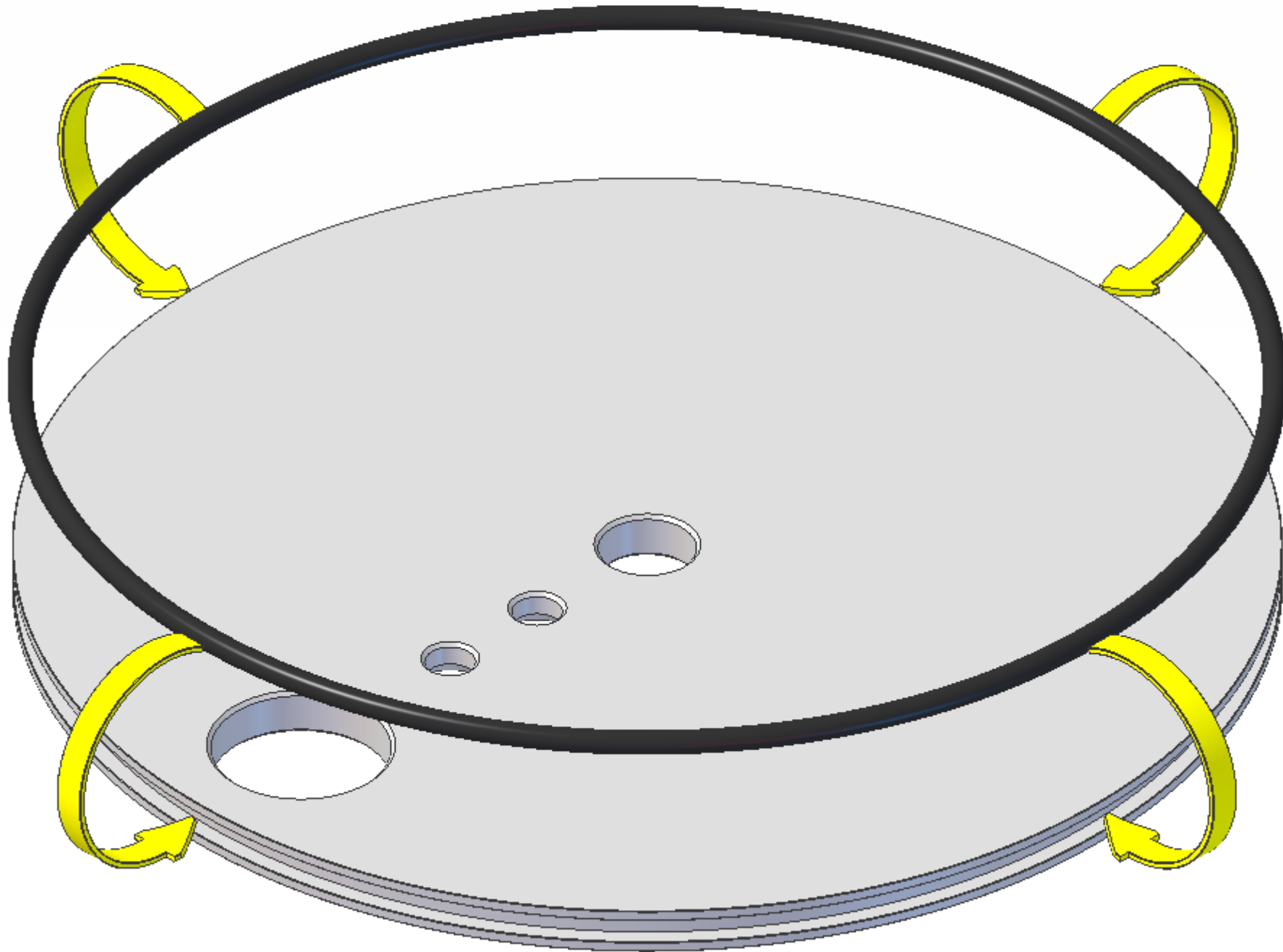


7mm O ring x1

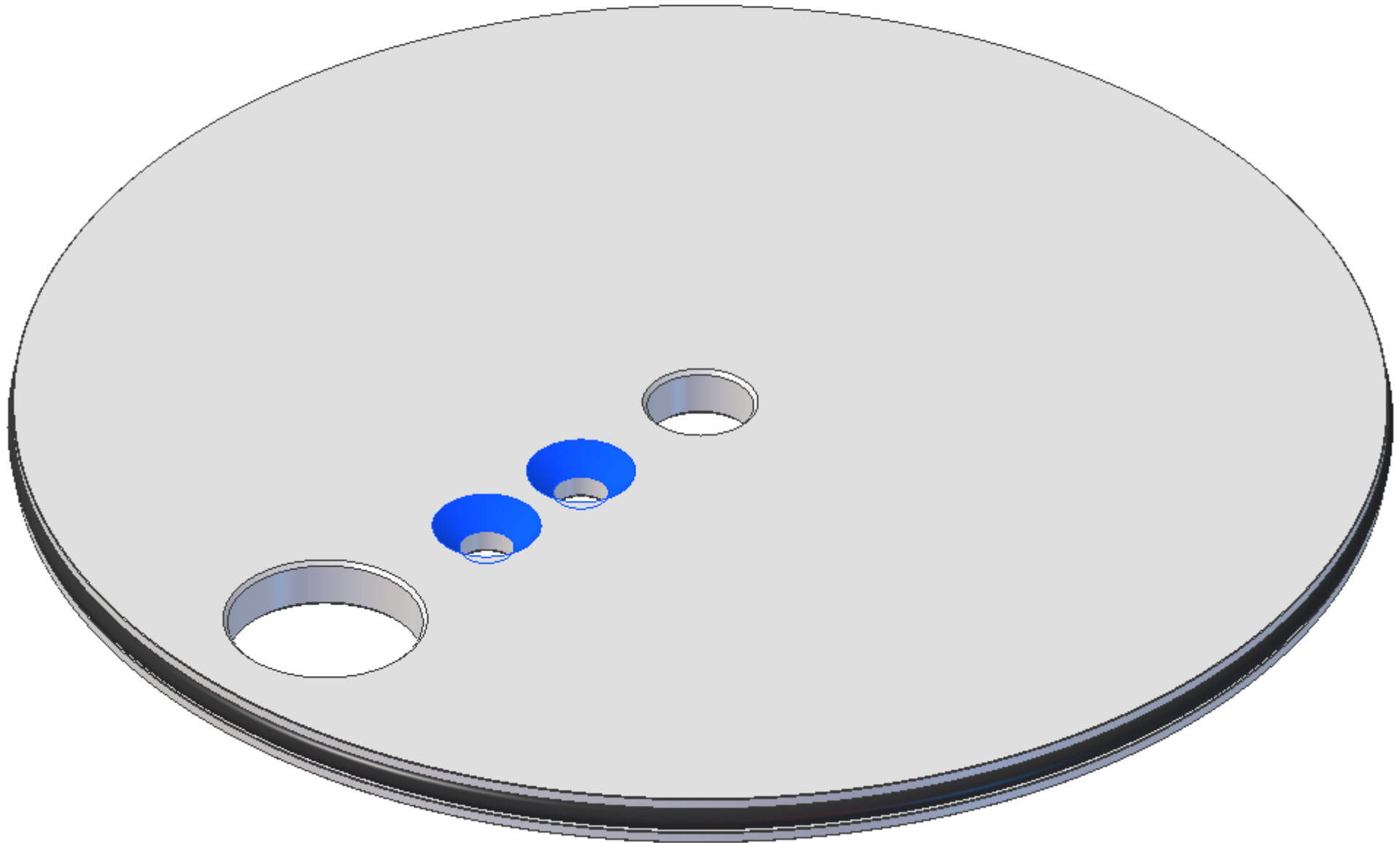
Remove the protective film from both sides of the top plate. Once you have removed the film try to handle the plate by its edges, this will minimise fingerprints.



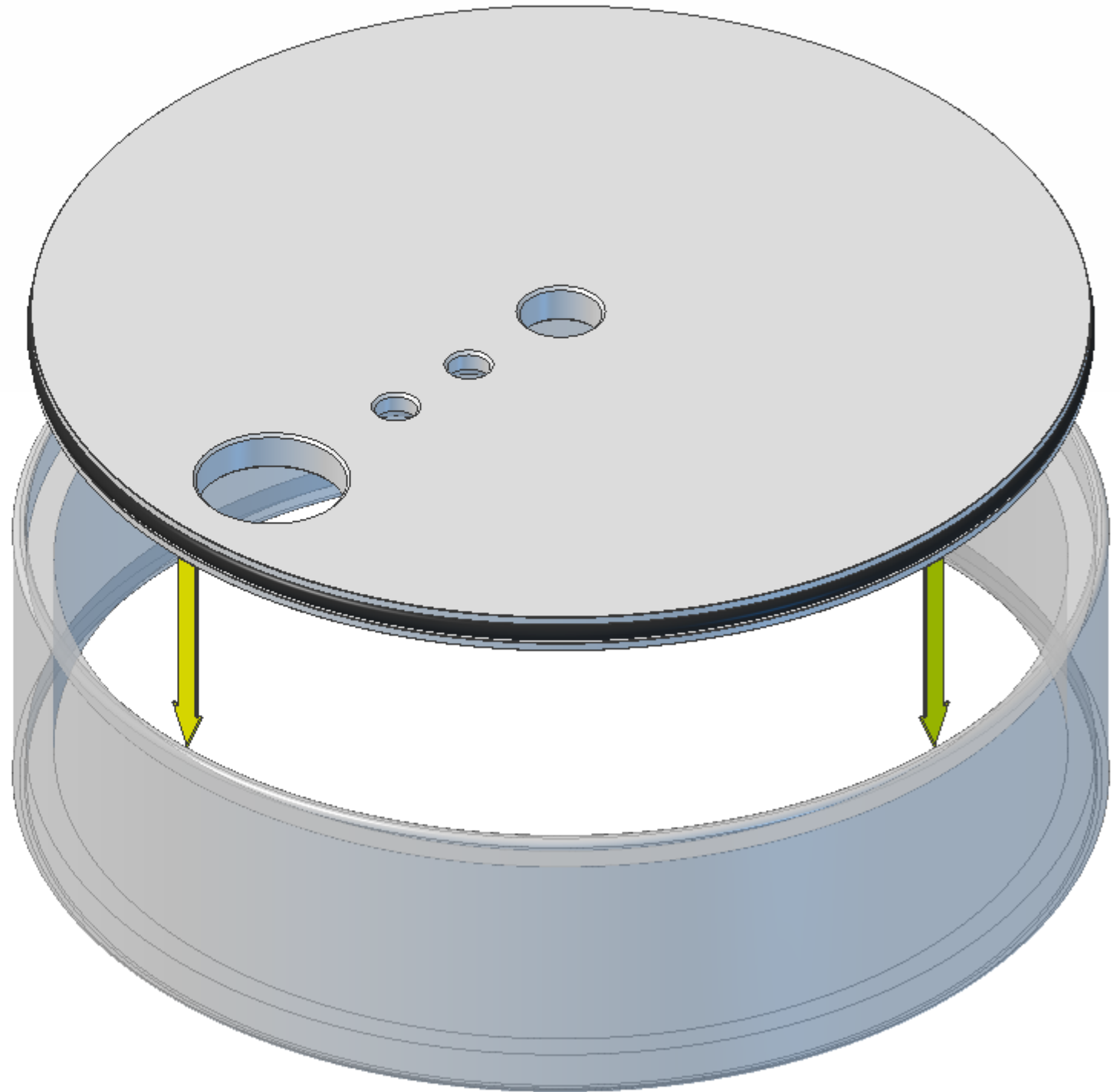
Fit one 75mm O ring into the groove in the edge of the plate. It will need a slight stretch to get it over the edge of the plate.



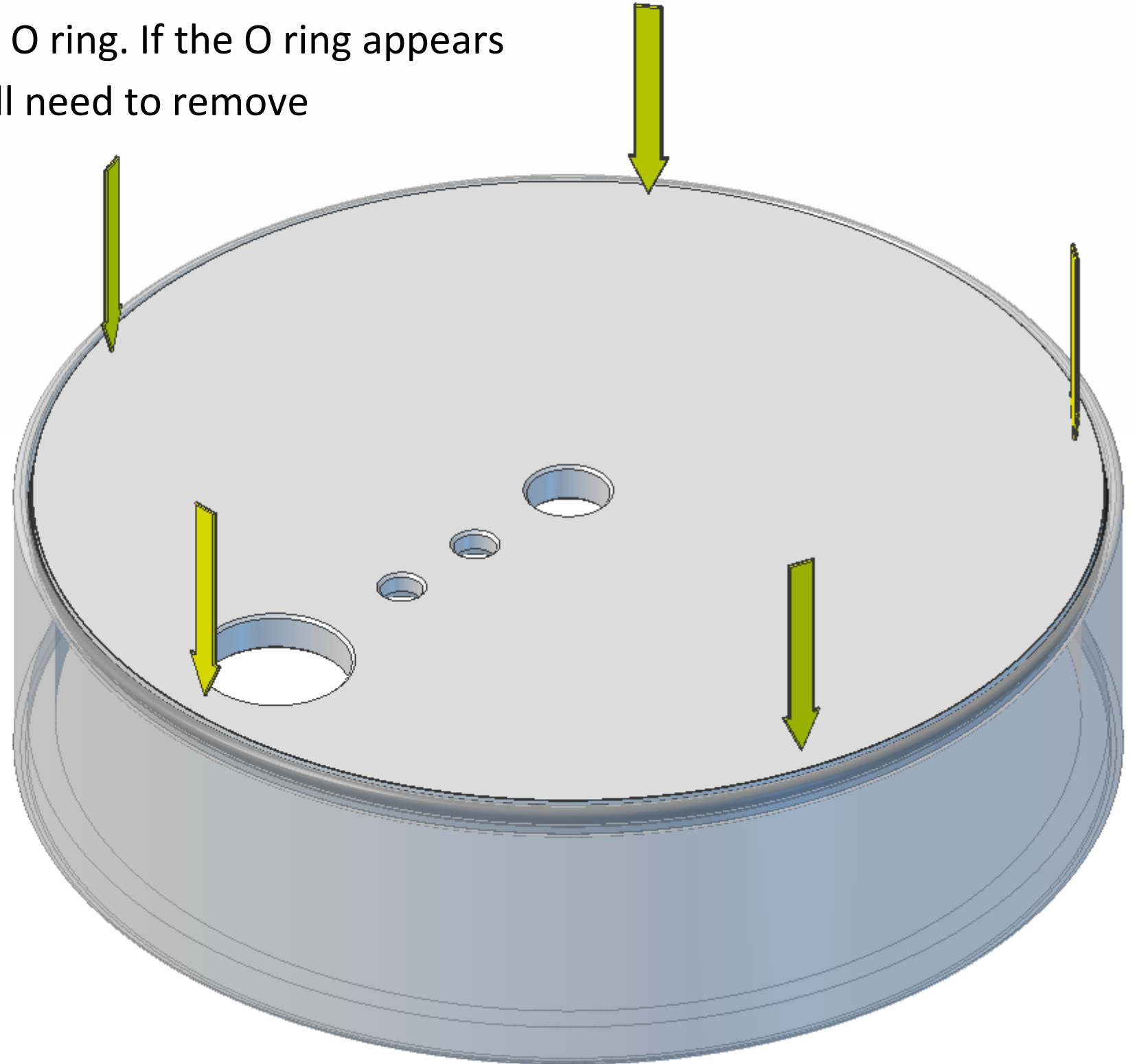
Locate the underside of the top plate. The underside is the side with the countersinks on the two holes as shown in the diagram.



Moisten the 75mm O ring sparingly with slightly soapy tap water to lubricate it. Lay the chamber wall on your work surface (either way up, both ends are the same) and with the underside of the top plate facing downwards lower the plate & O ring into the rebate in the end of the chamber wall. The O ring should rest lightly on the top edge of the rebate.



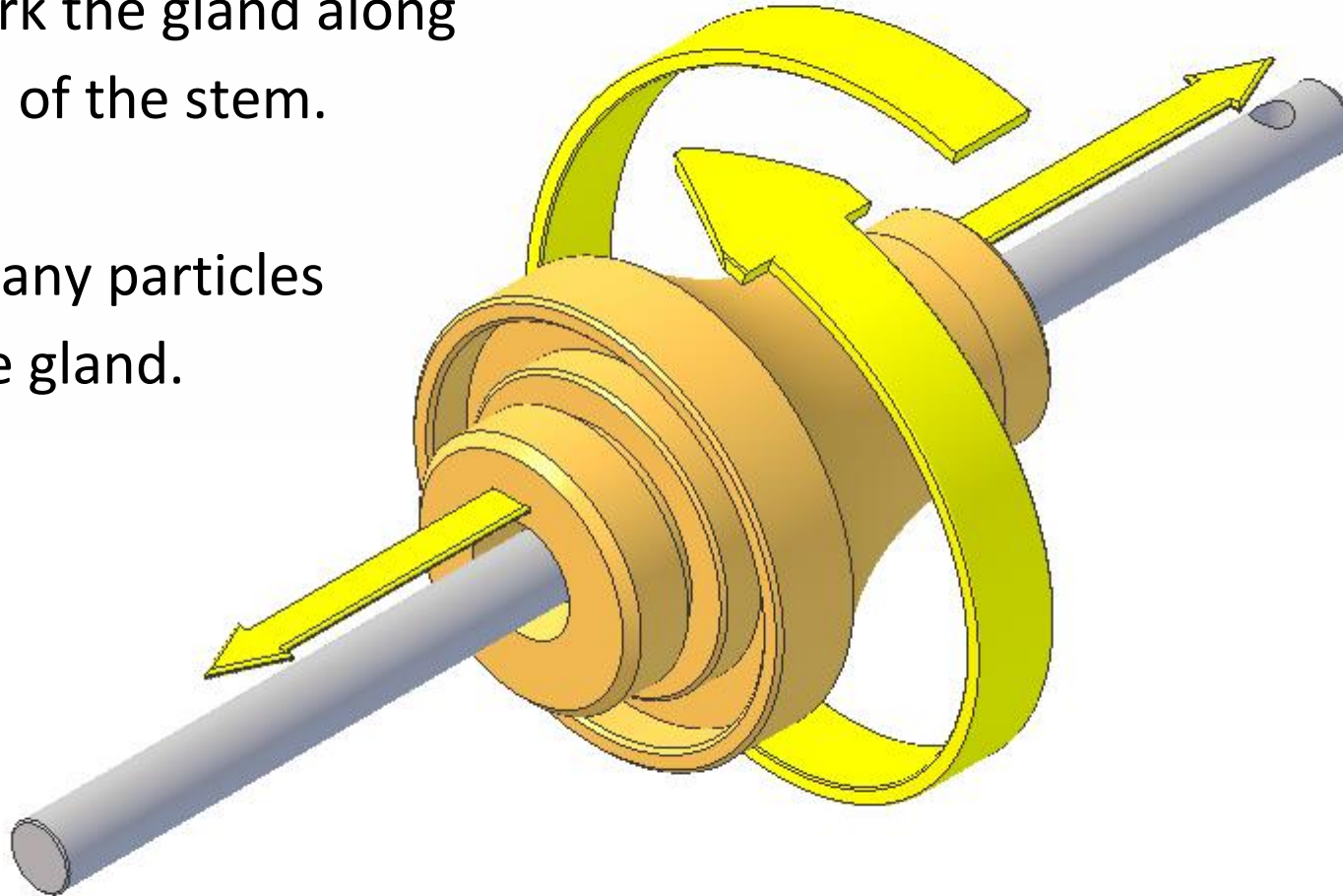
Apply gentle but firm pressure around the edge of the plate; the moistened O ring should squeeze into the rebate without any trouble. Work your way around the plate, pressing down as you go. The plate should fit fully down into the bottom of the rebate without any bunching or pinching of the O ring. If the O ring appears bunched or pinched you will need to remove the plate & O ring and re-fit.



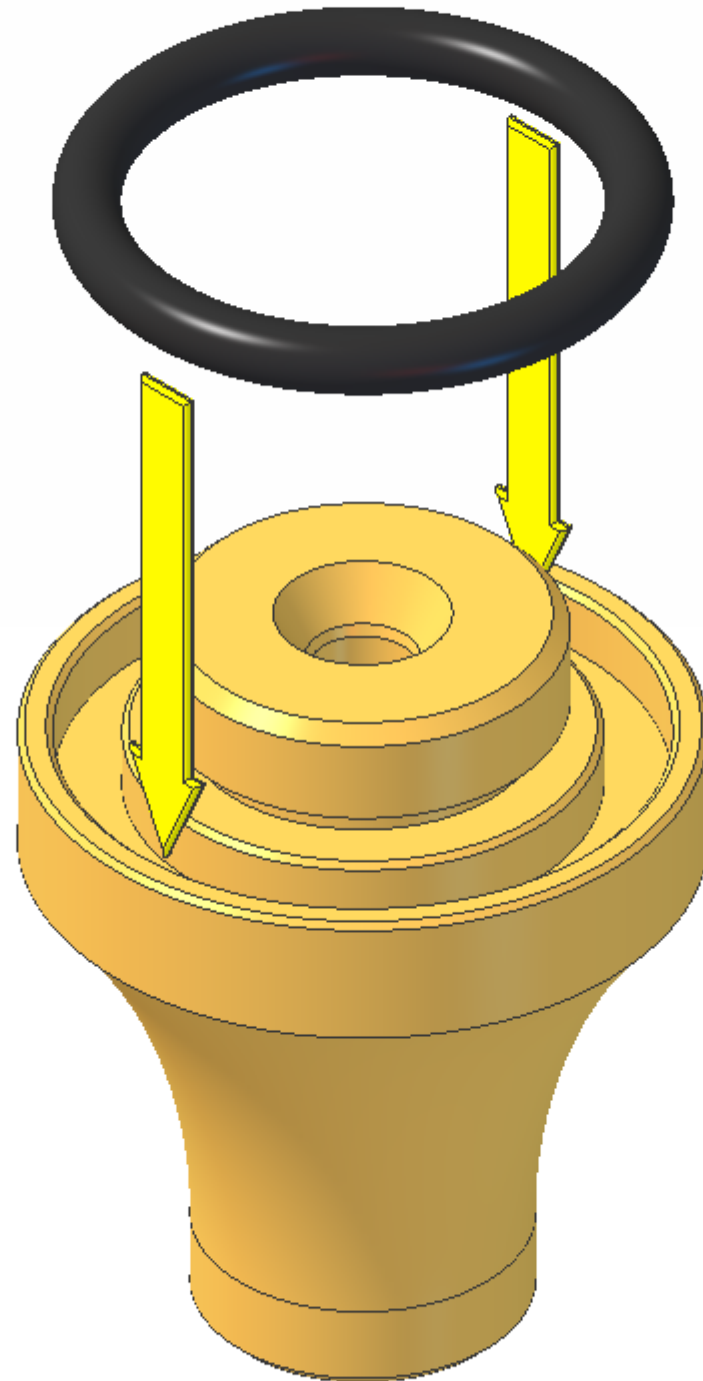
Slide the gland onto the gland stem, hold the stem between the thumb and forefinger of your left hand and roll the gland along the side of your right hand forefinger.

As you roll it, work the gland along the whole length of the stem.

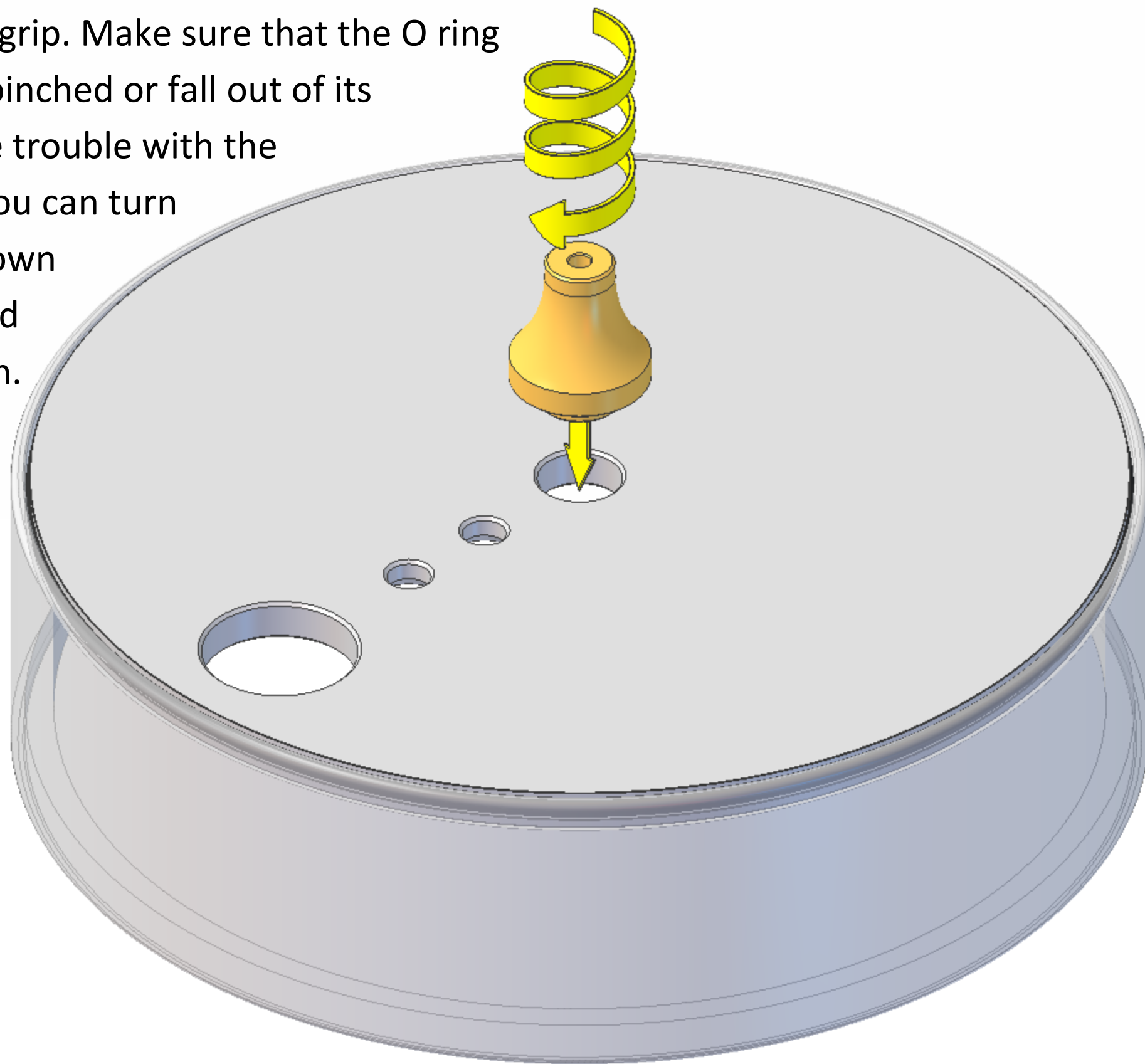
This will remove any particles of dust inside the gland.



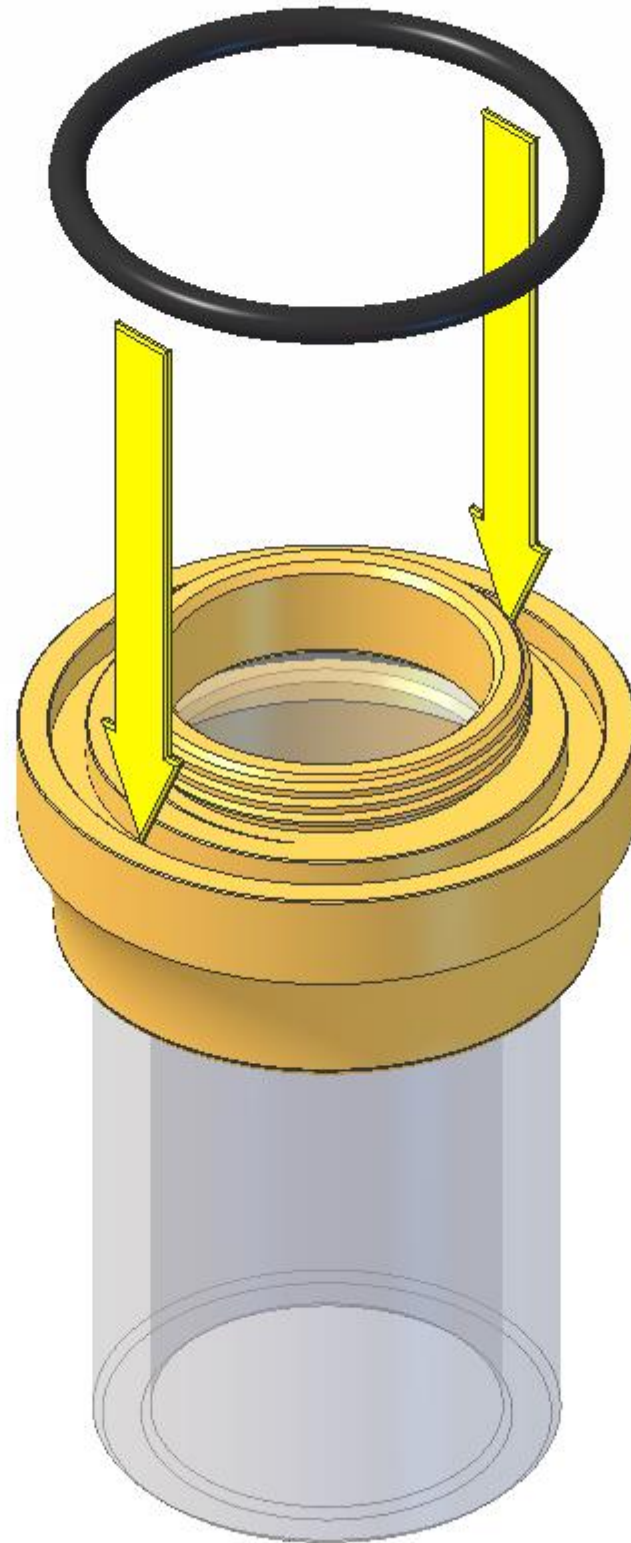
Fit one 7mm O ring into the groove in the bottom of the gland.



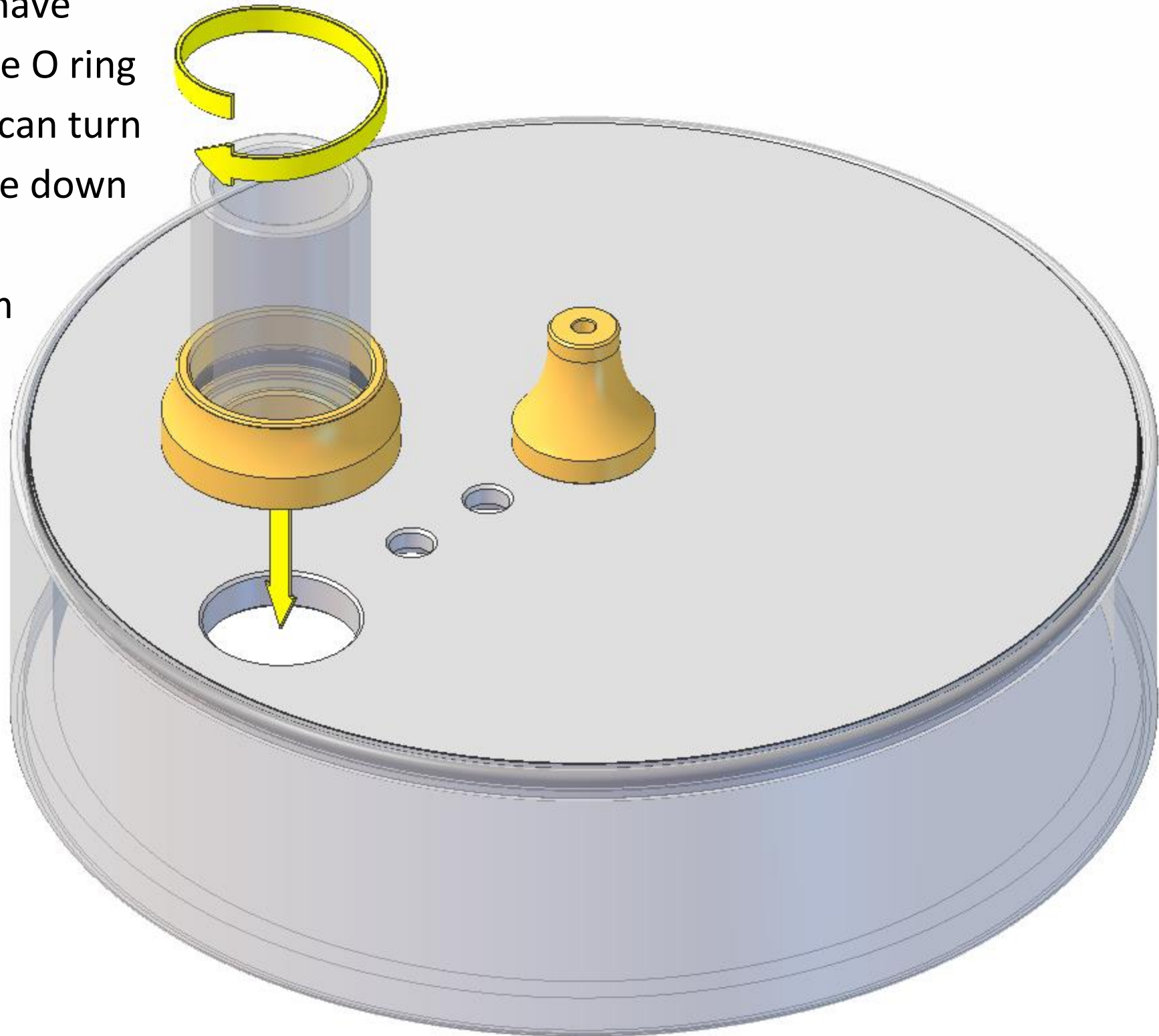
Screw the gland into the top plate and fully tighten, you might need to wrap an elastic band around it for grip. Make sure that the O ring does not become pinched or fall out of its groove. If you have trouble with the O ring falling out you can turn the plate upside down and screw the gland in from underneath.

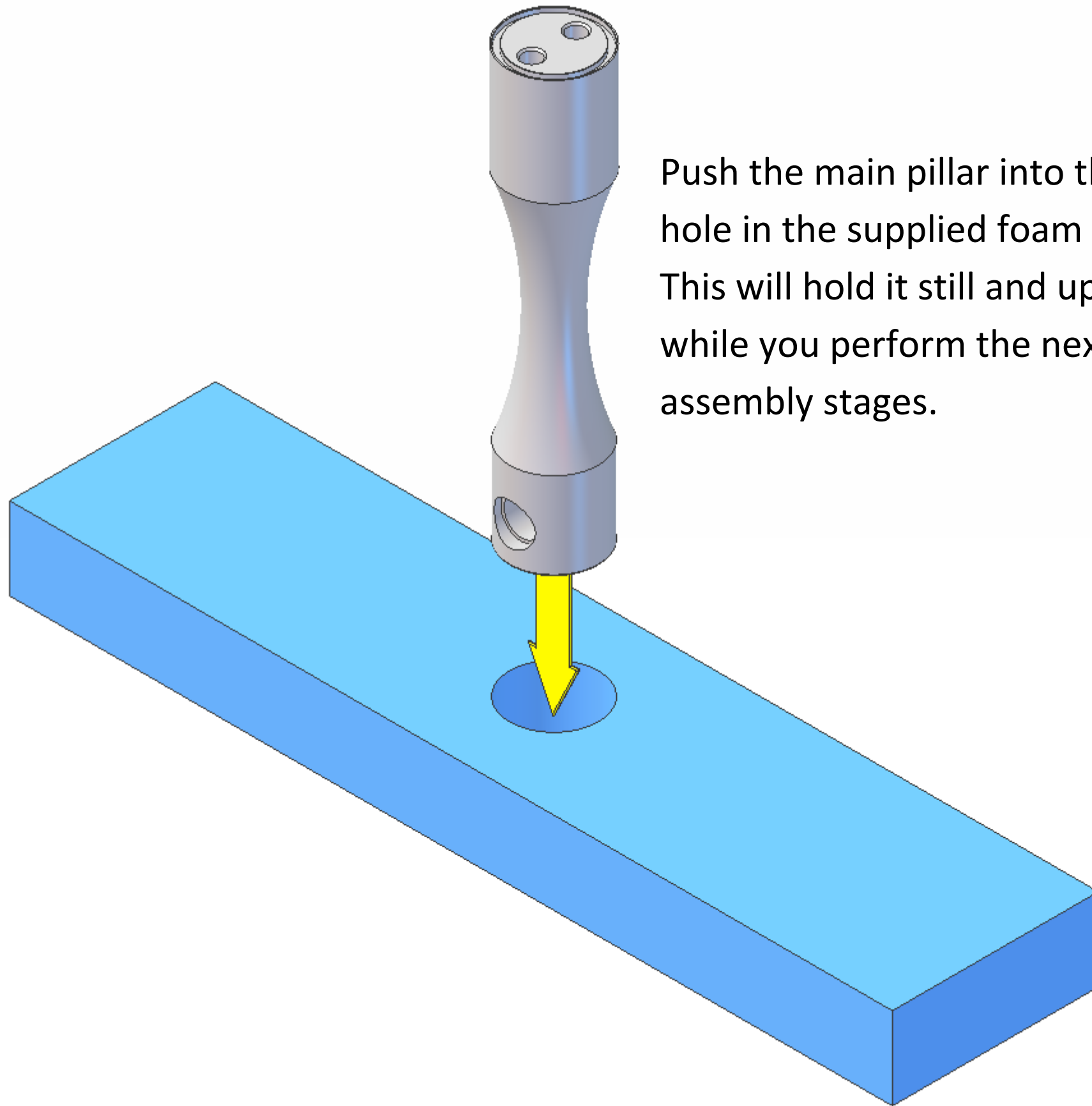


Fit one 13mm O ring into the groove in the bottom of the cylinder.

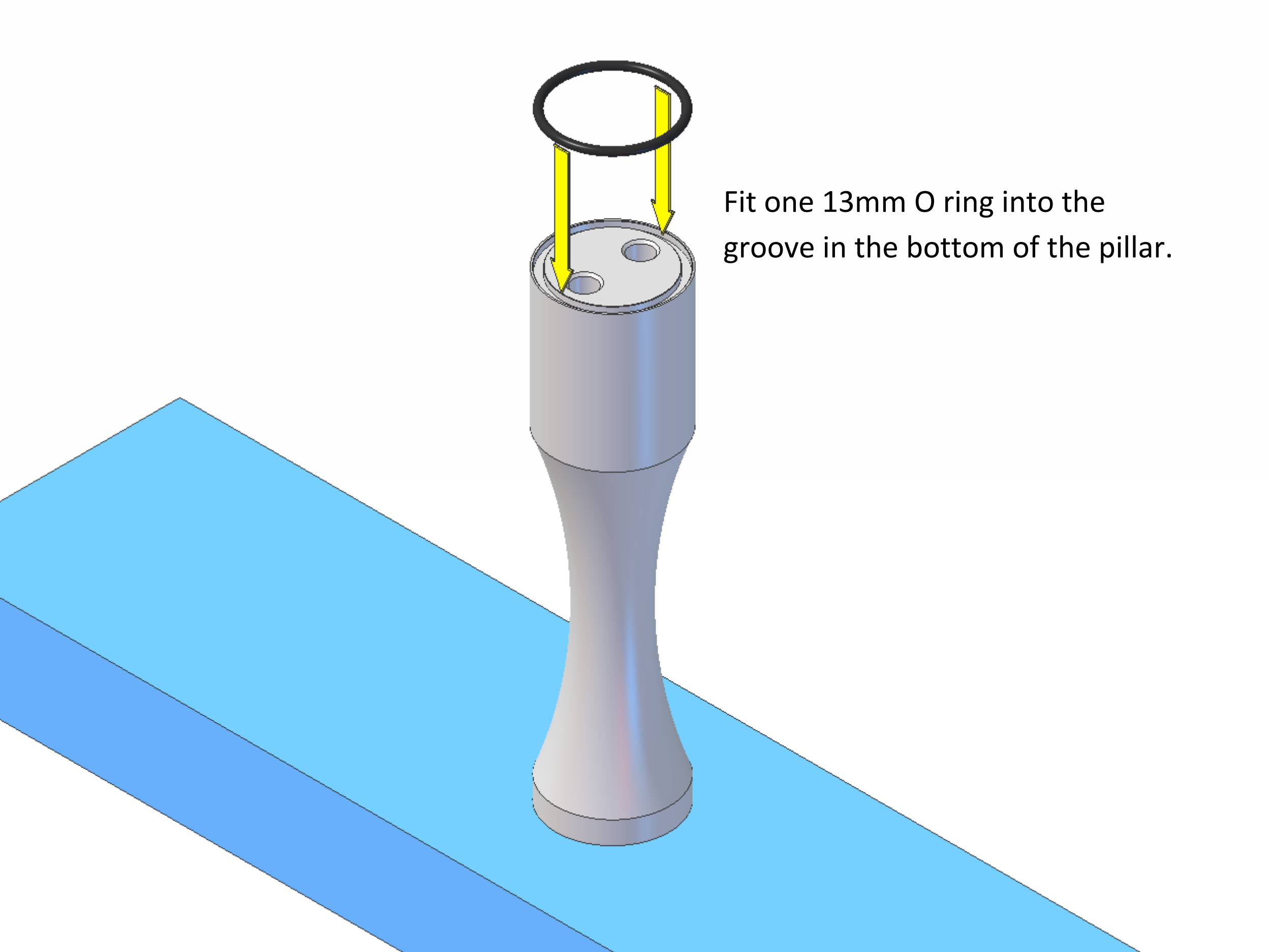


Screw the cylinder into the top plate and fully tighten, you might need to wrap an elastic band around it for grip. Make sure that the O ring does not become pinched or fall out of its groove. If you have trouble with the O ring falling out you can turn the plate upside down and screw the cylinder in from underneath.

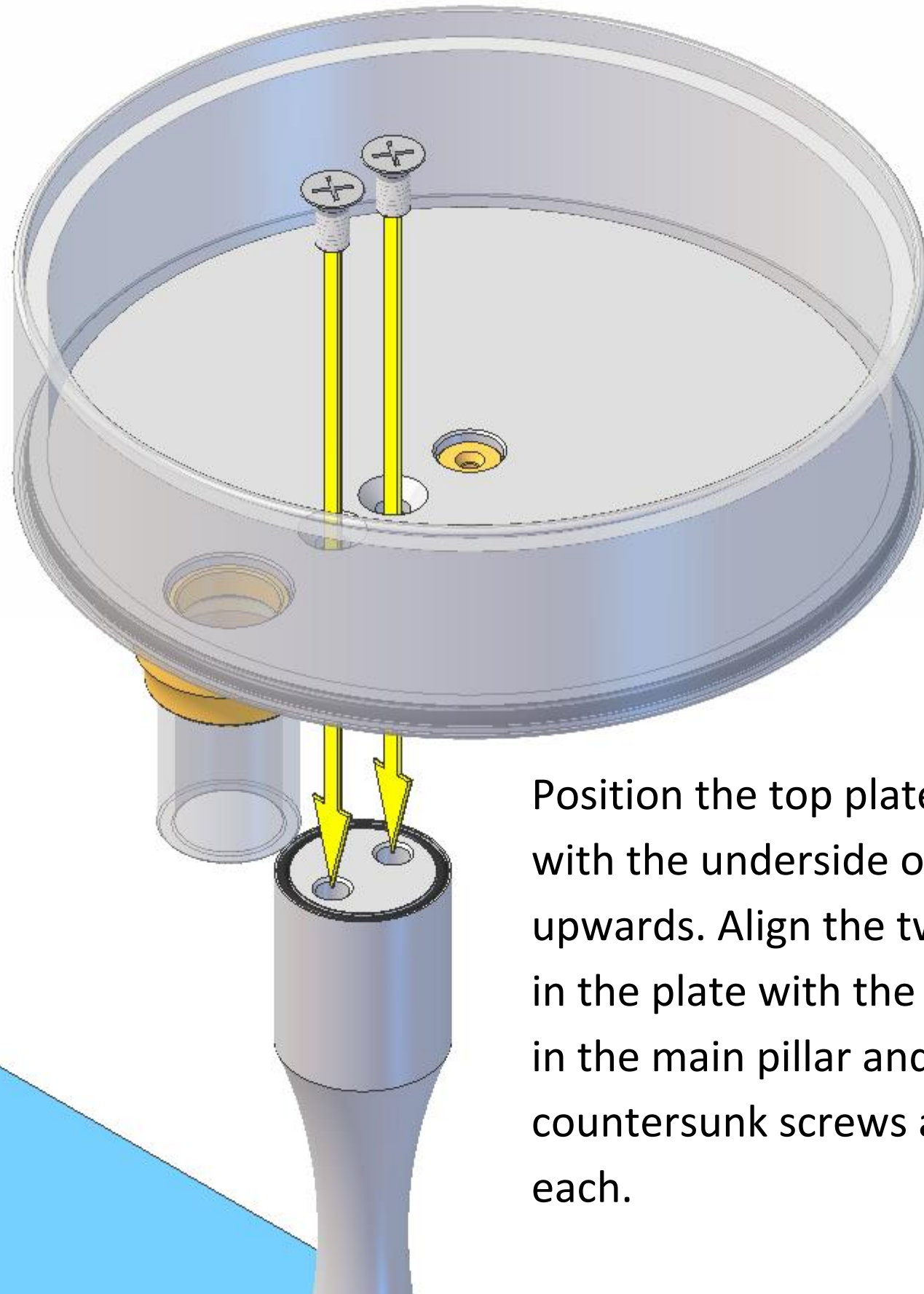




Push the main pillar into the hole in the supplied foam block. This will hold it still and upright while you perform the next few assembly stages.

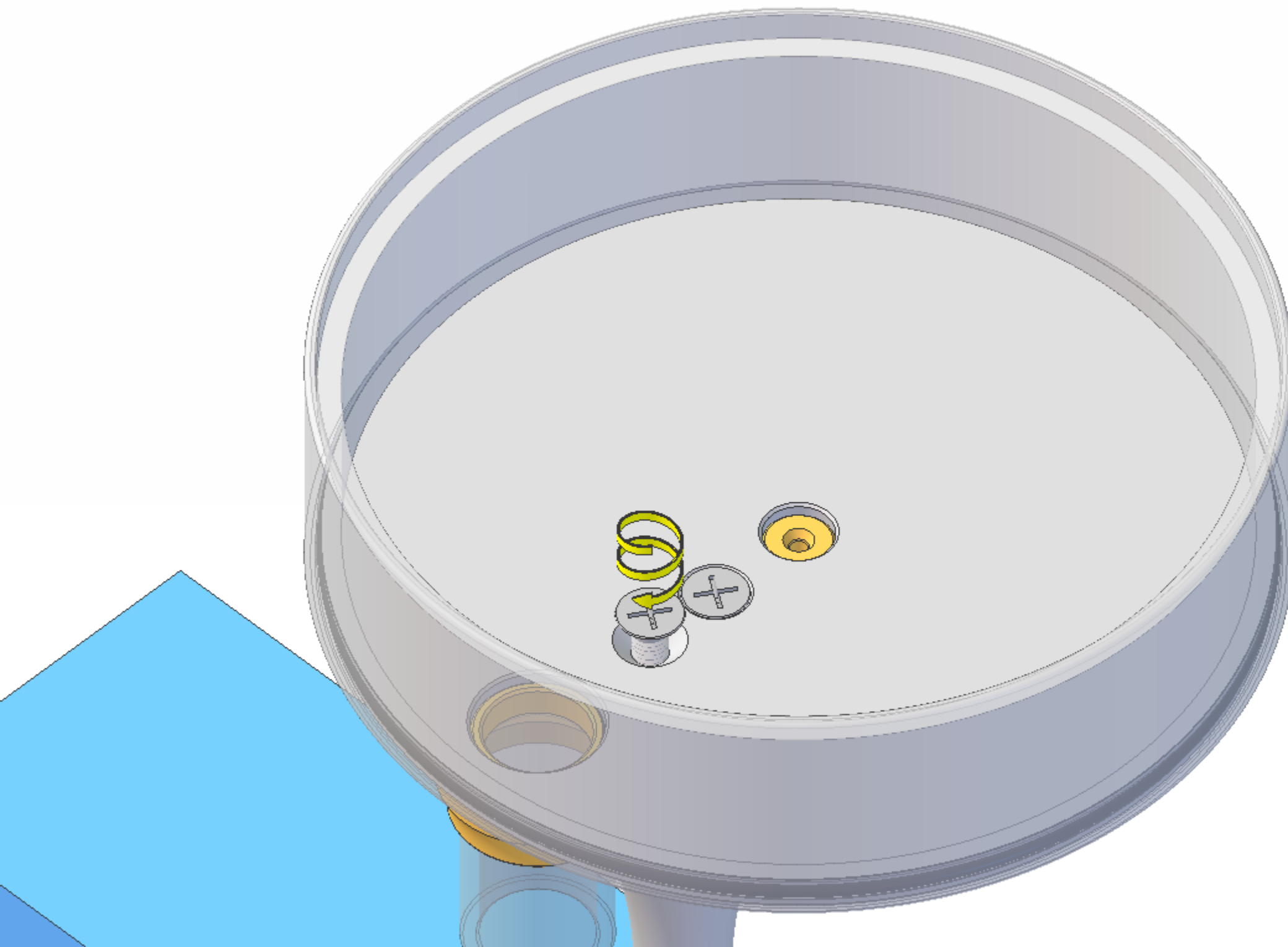


Fit one 13mm O ring into the groove in the bottom of the pillar.



Position the top plate over the main pillar, with the underside of the top plate facing upwards. Align the two countersunk holes in the plate with the two threaded holes in the main pillar and fit two M3x6mm countersunk screws a couple of turns each.

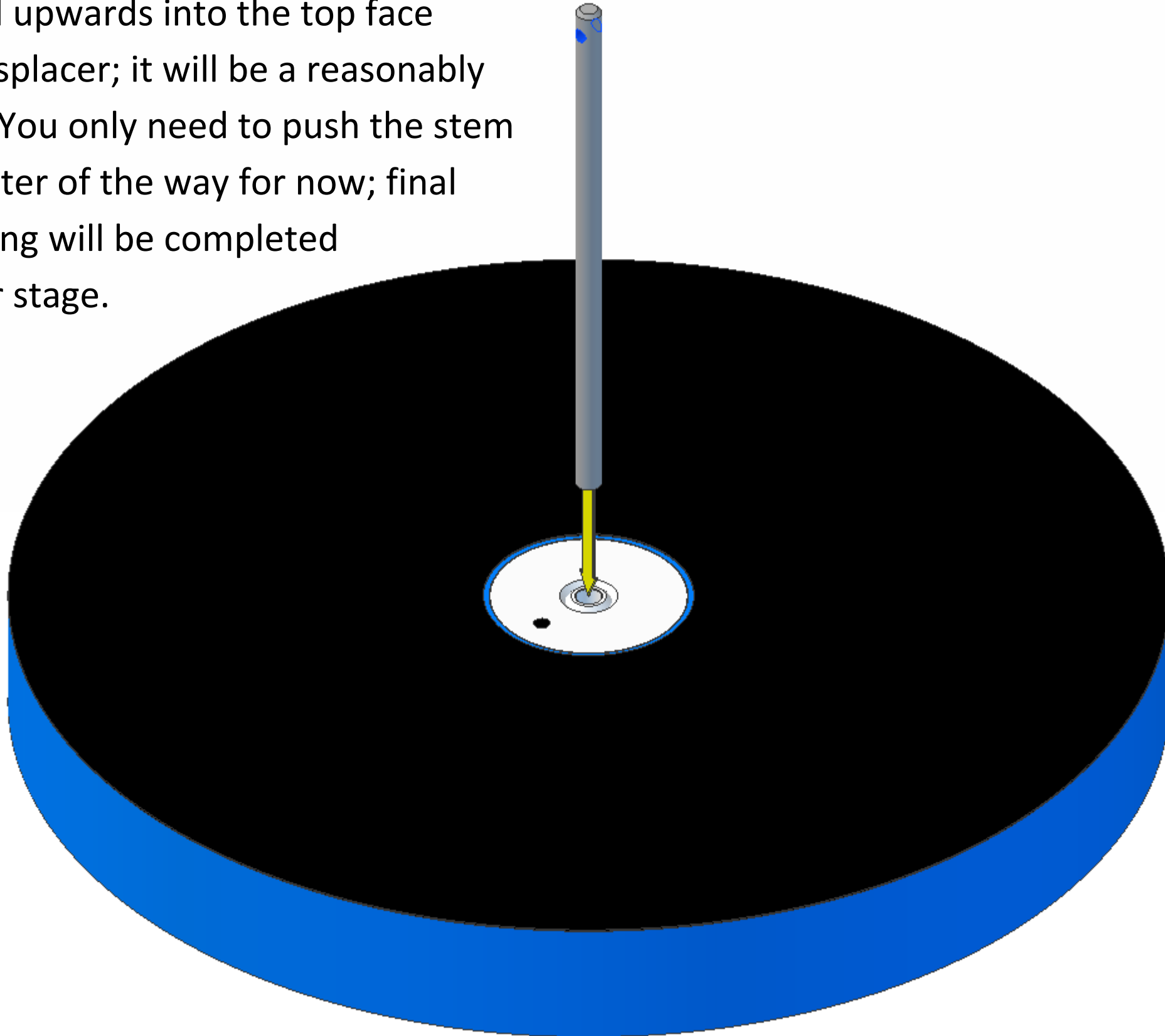
Screw the screws in until they both lightly touch the top plate, then fully tighten.



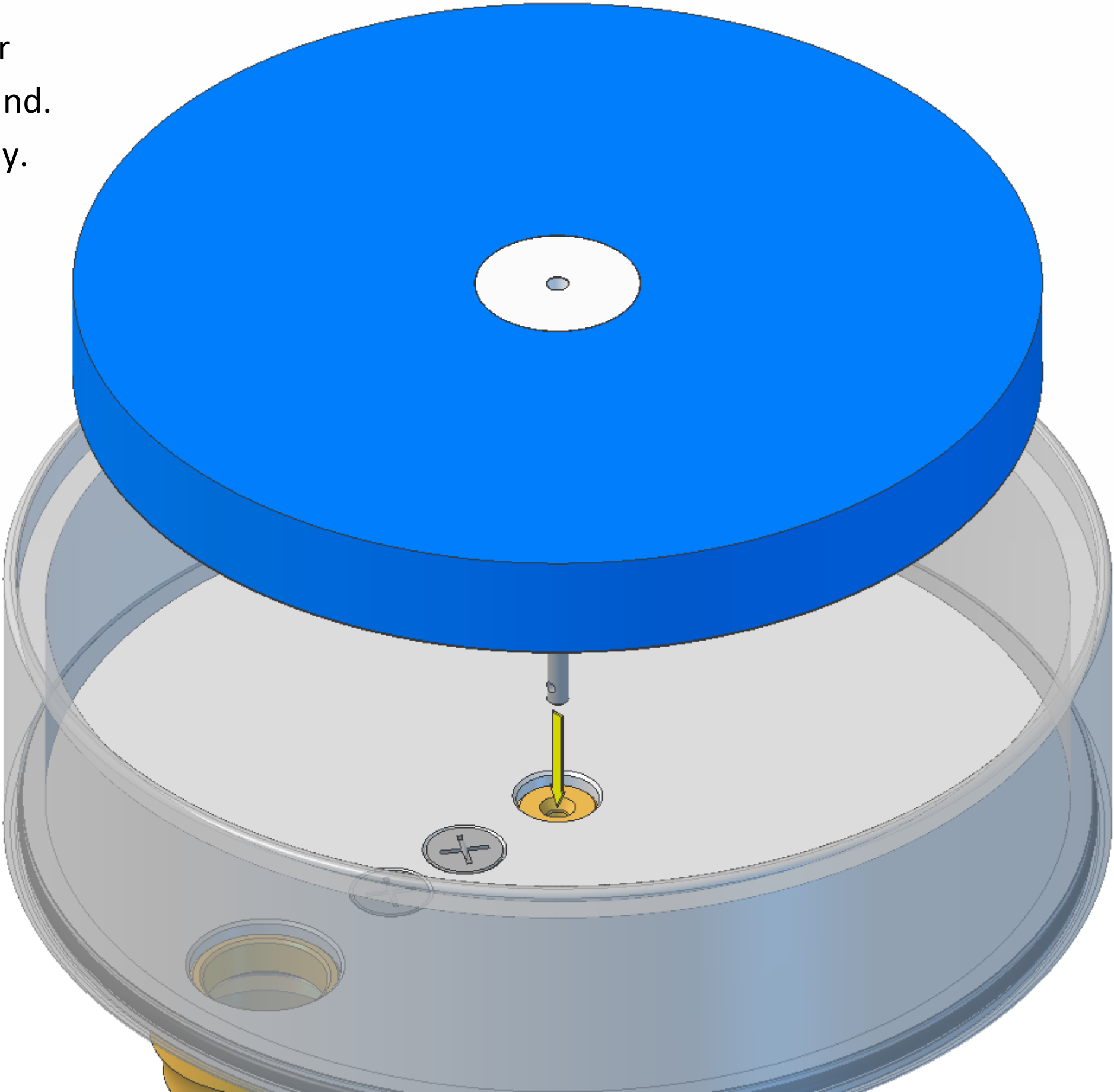
Wipe the gland stem with a clean cloth or paper towel to remove any dust and fingerprints. One end of the stem is plain and the other has a small through it. The hole-end should point upwards in the next assembly stage.



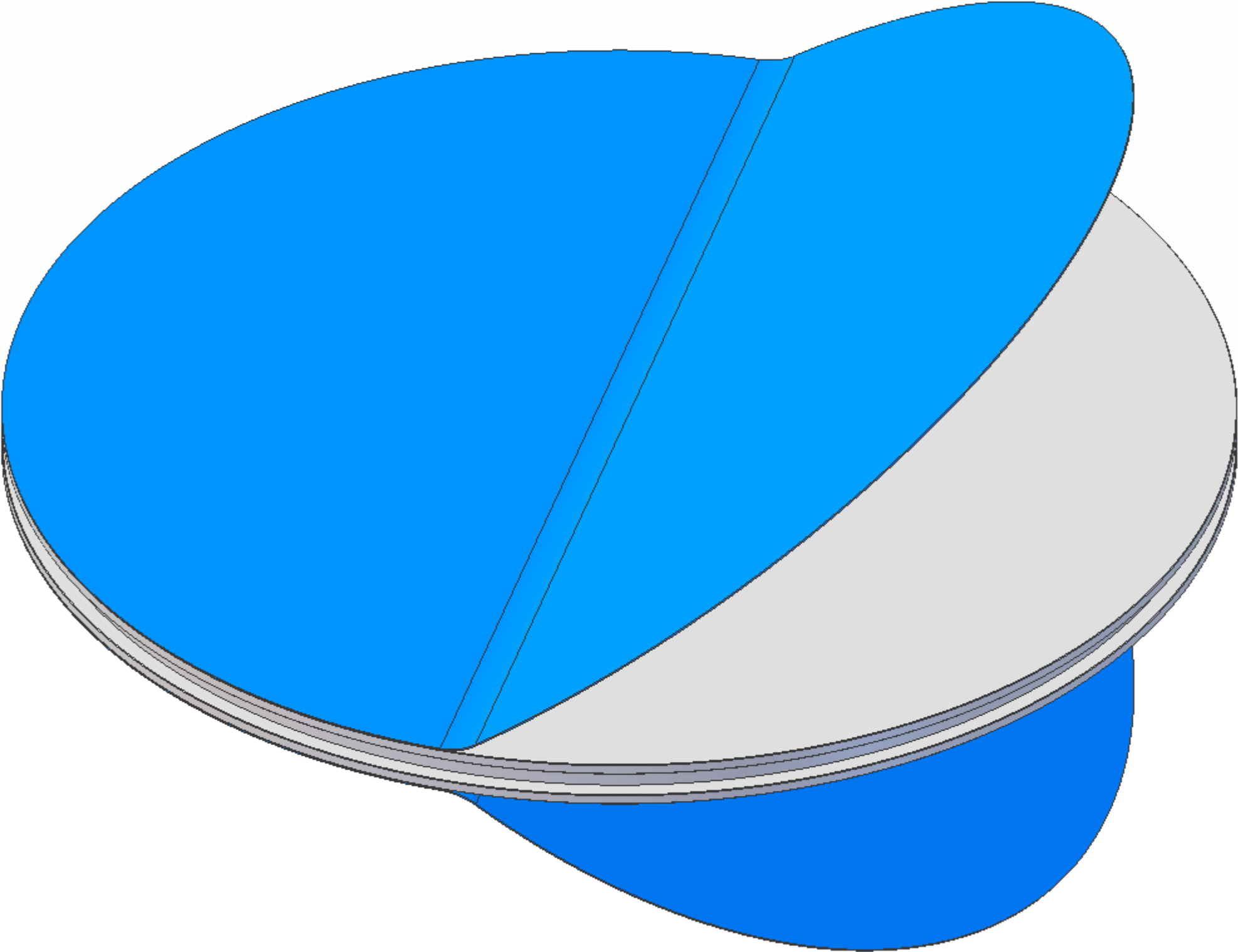
One face of the displacer has been painted black, this is the top face. Insert the gland stem hole-end upwards into the top face of the displacer; it will be a reasonably tight fit. You only need to push the stem in a quarter of the way for now; final positioning will be completed at a later stage.

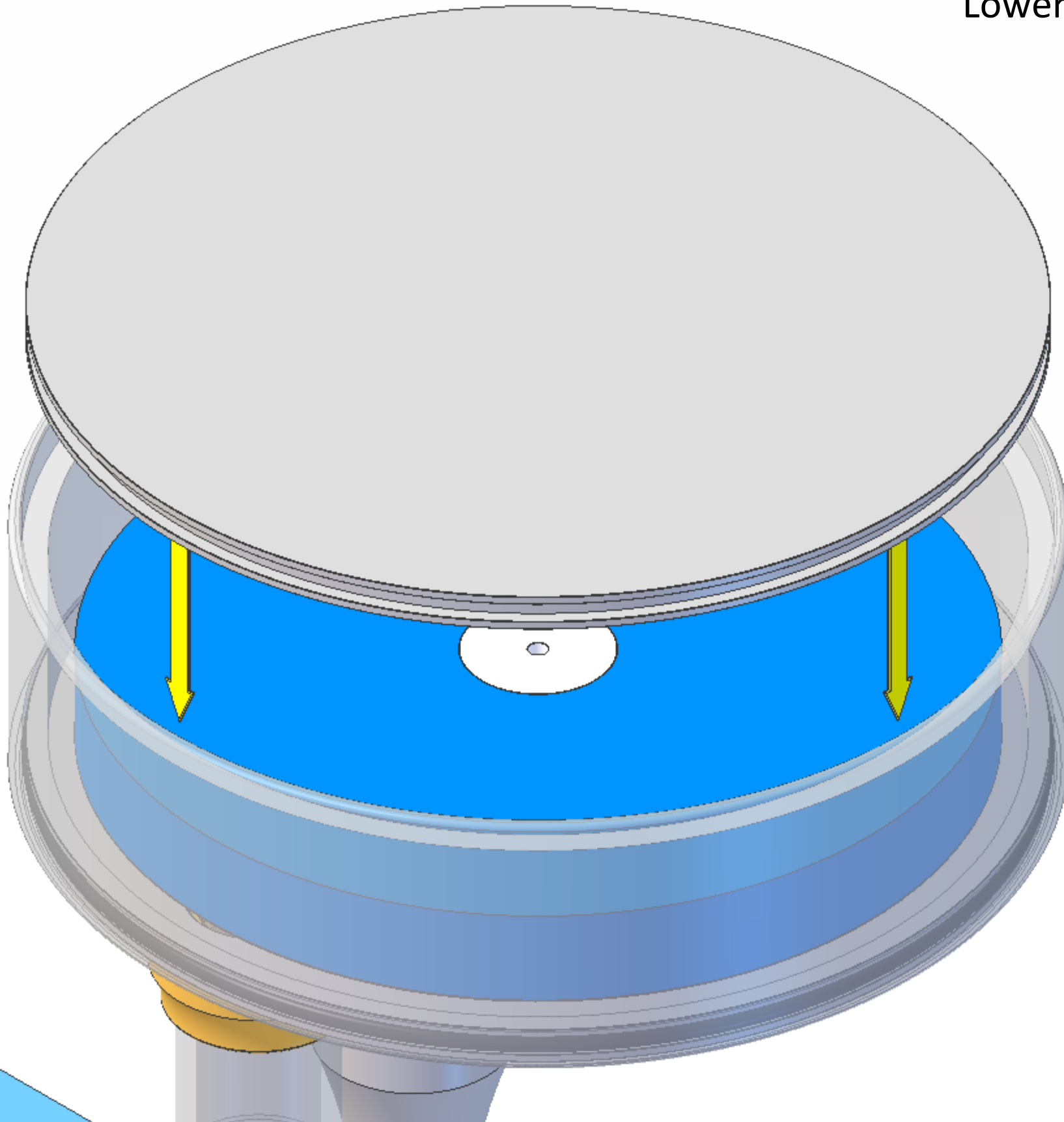


Lower the displacer
& stem into the gland.
It should slide freely.



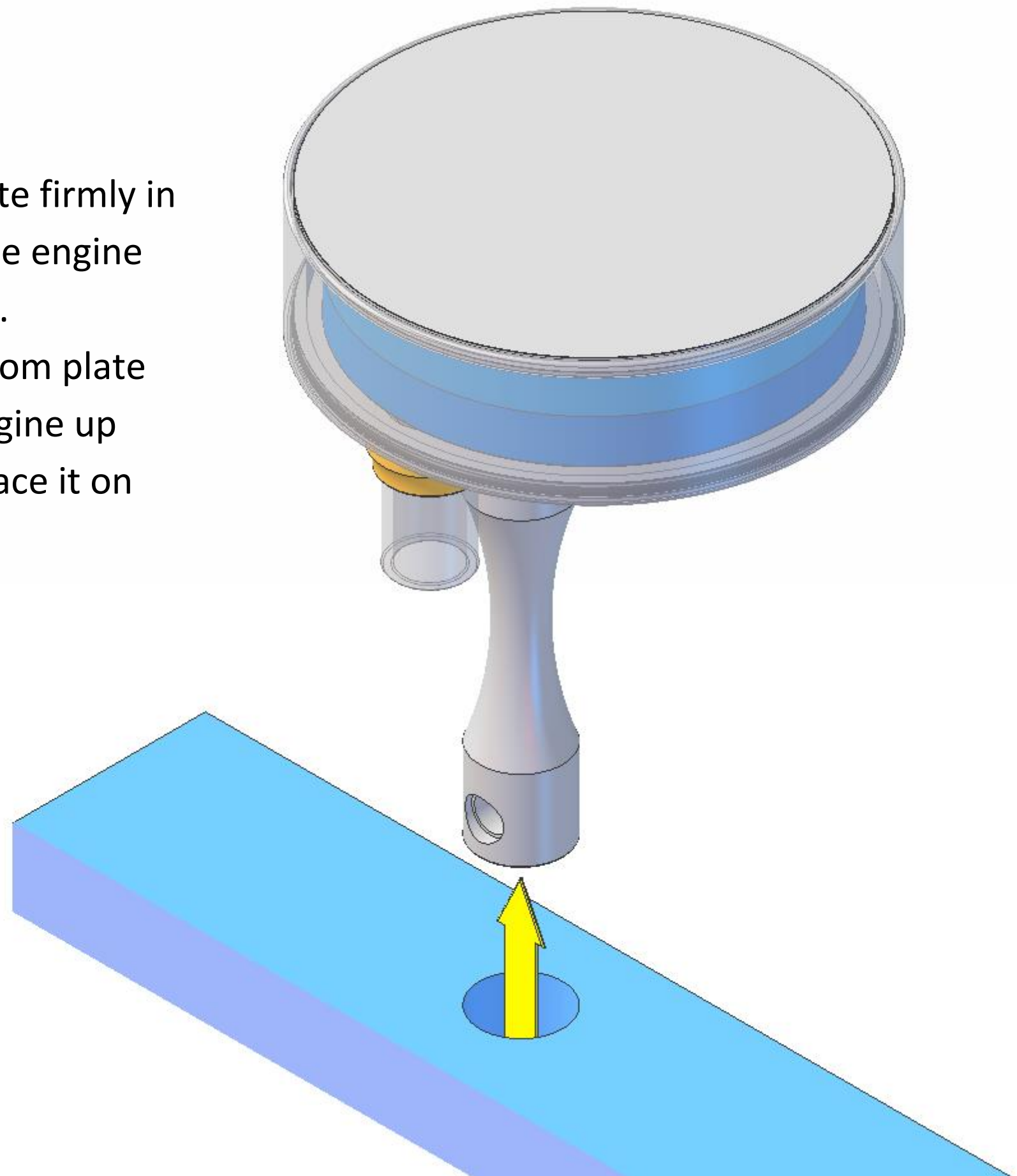
Remove the protective film from both sides of the bottom plate. Once you have removed the film try to handle the plate by its edges, this will minimise fingerprints.



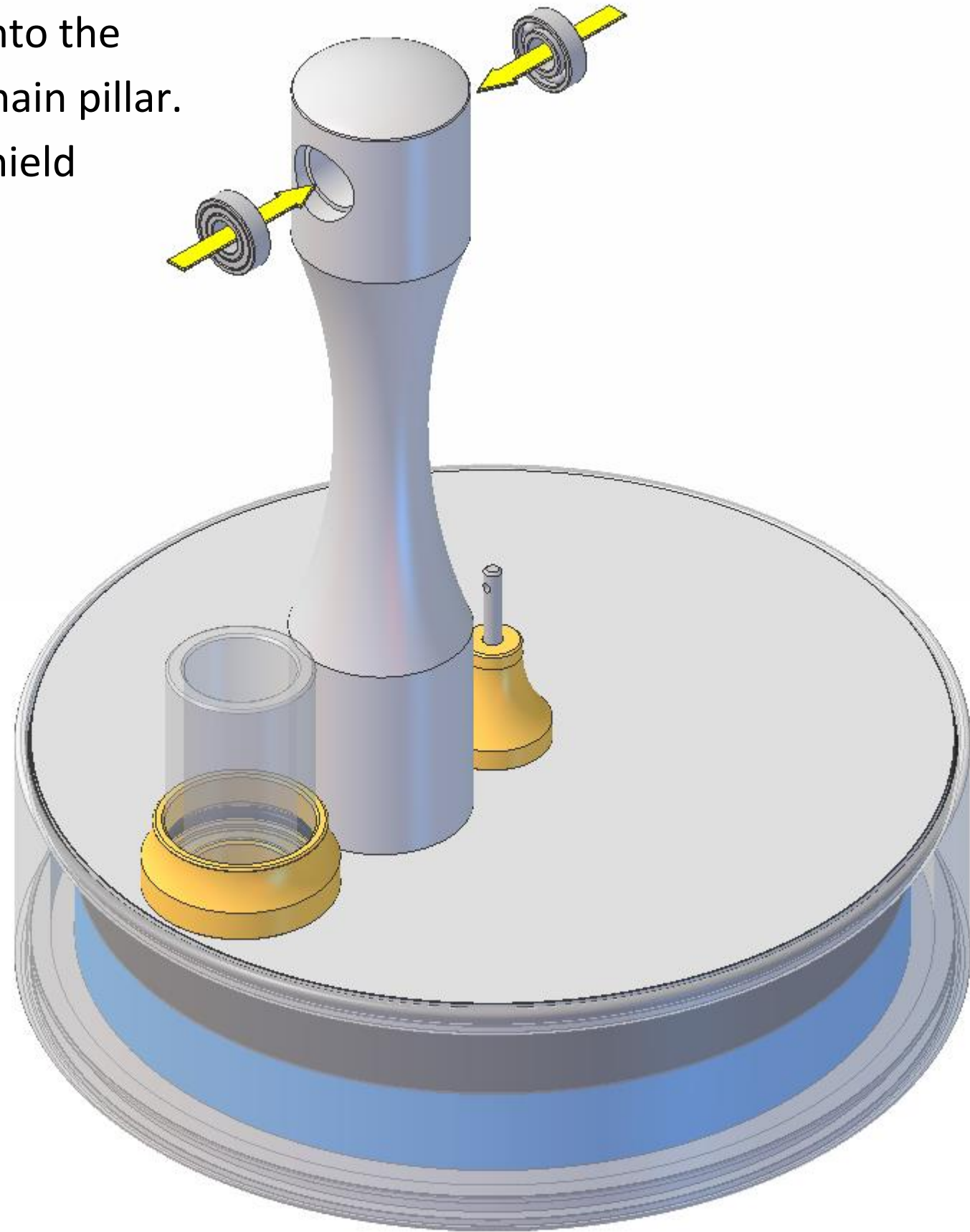


Lower the bottom plate into the rebate in the end of the chamber wall. The plate will be a loose fit because it does not have its 75mm O ring fitted yet. The O ring will be fitted at a later stage.

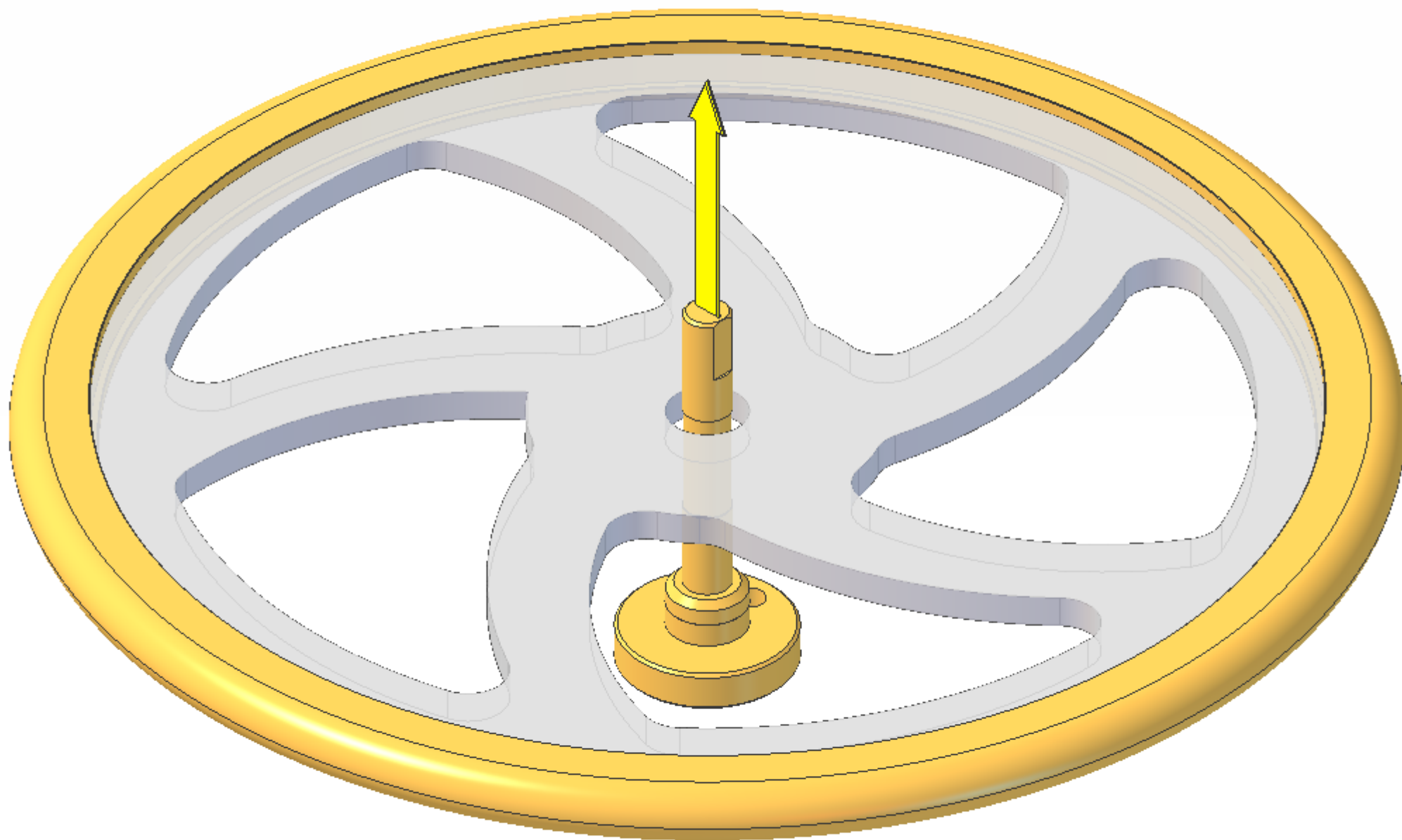
Hold the bottom plate firmly in place and remove the engine from the foam block.
Still holding the bottom plate in place, turn the engine up the right way and place it on your work surface.



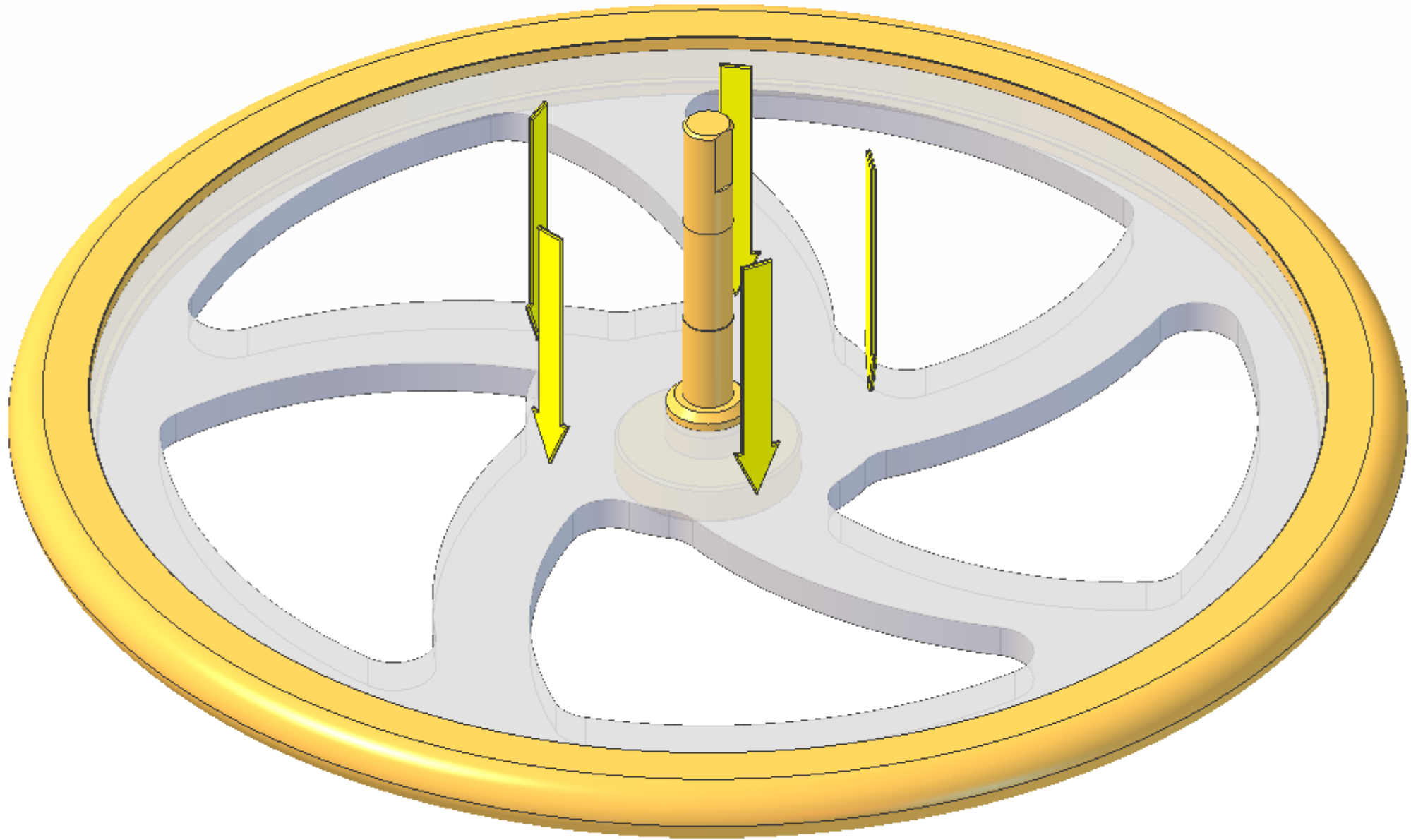
Fit two ball-race bearings into the recesses in the top of the main pillar. The bearings have a dust shield on one side and are open on the other. The shielded sides should face outwards after fitting.



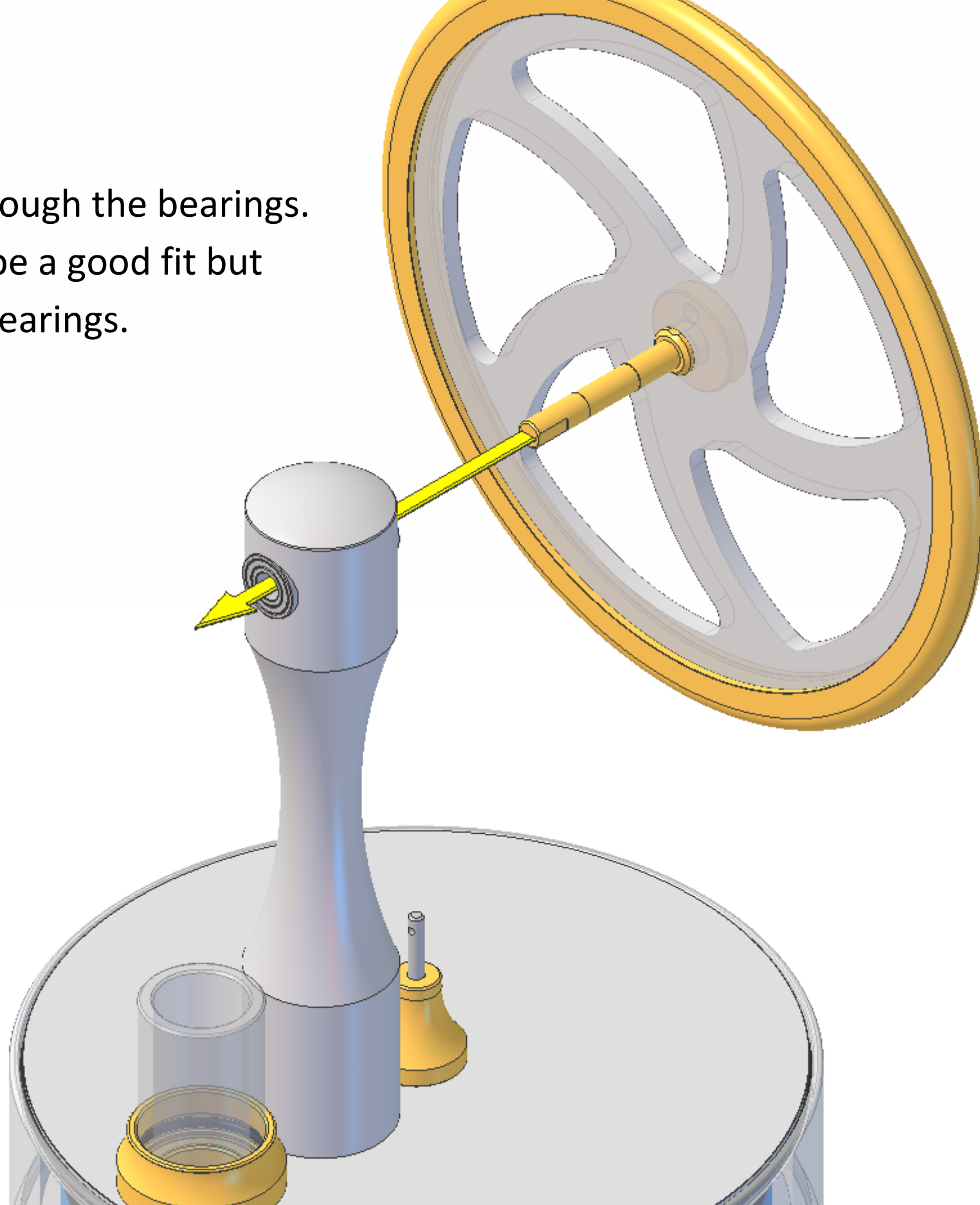
Insert the hub into the flywheel; align the spokes as shown in the diagram.



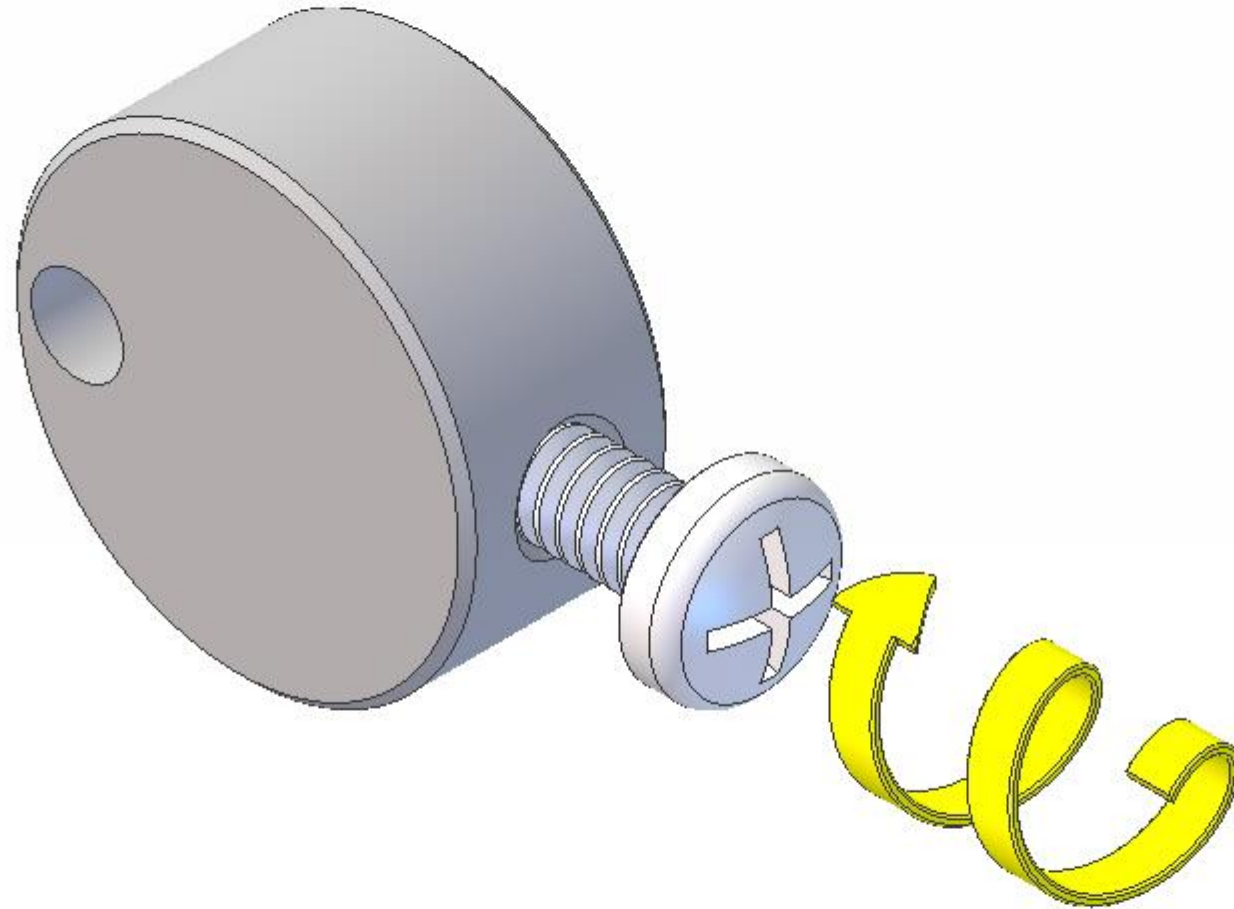
Put one of the empty packing bags on your work surface and place the flywheel and hub down on it. VERY carefully press the flywheel onto the hub, with your fingers spread evenly around the middle. Make sure when pressing down that you press down vertically.



Slide the axle through the bearings.
The axle should be a good fit but
not tight in the bearings.

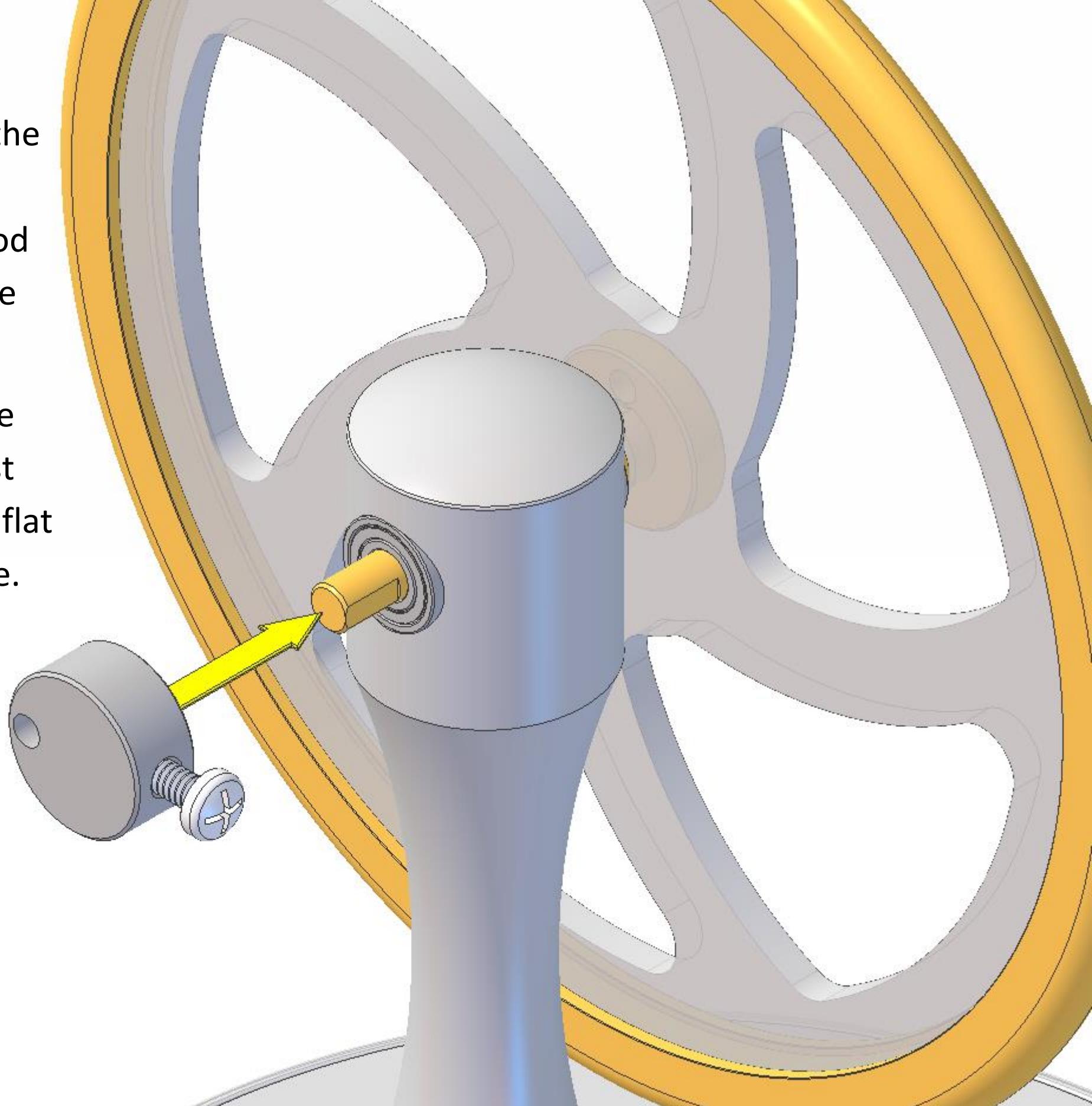


Screw one M2x4mm roundhead screw into the side of the crank a couple of turns.

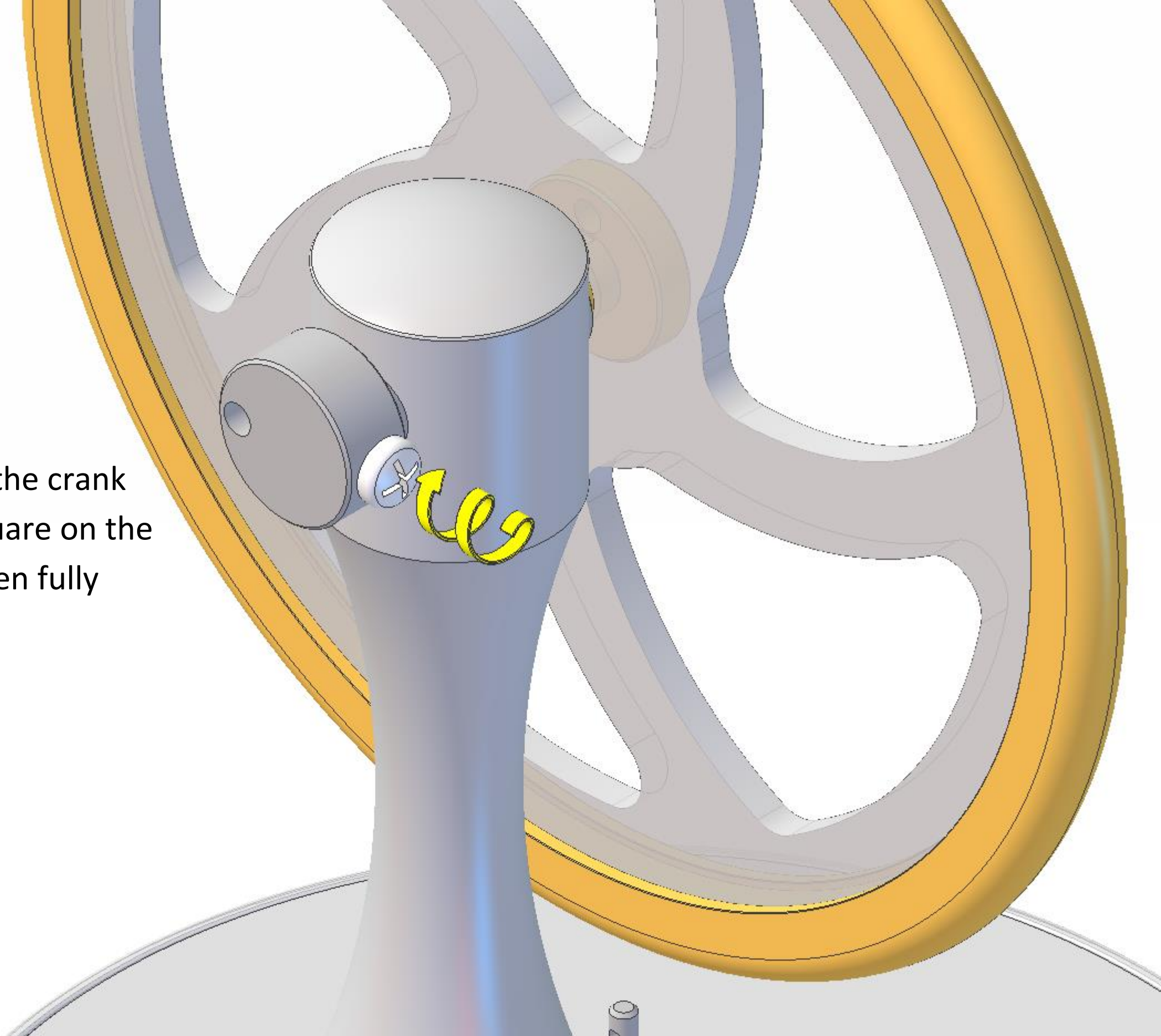


Slide the crank onto the end of the axle. The crank should be a good fit but not tight on the axle.

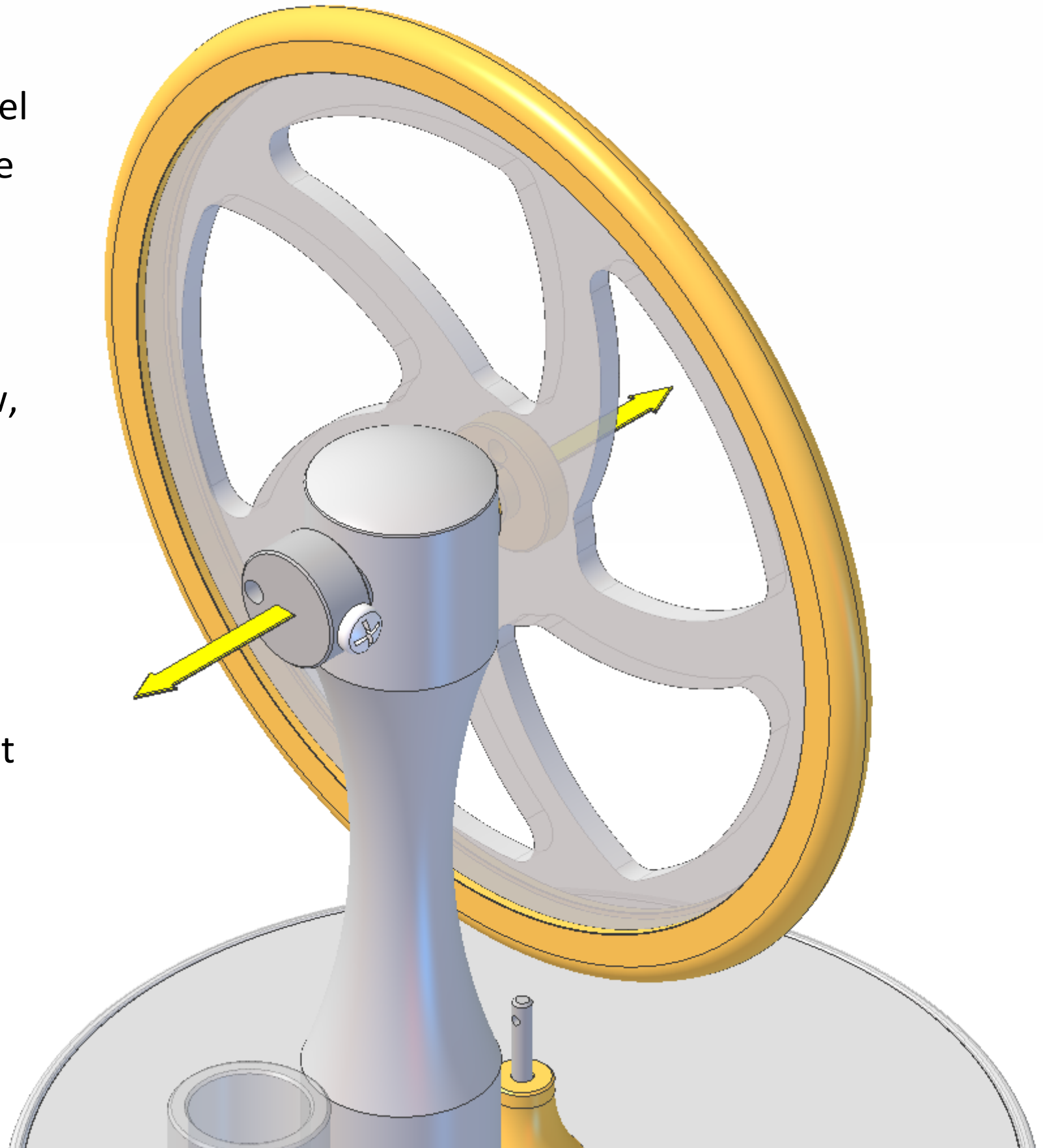
Note: the screw in the side of the crank must screw onto the small flat on the end of the axle.



Make sure the crank
screw is square on the
axle flat, then fully
tighten.

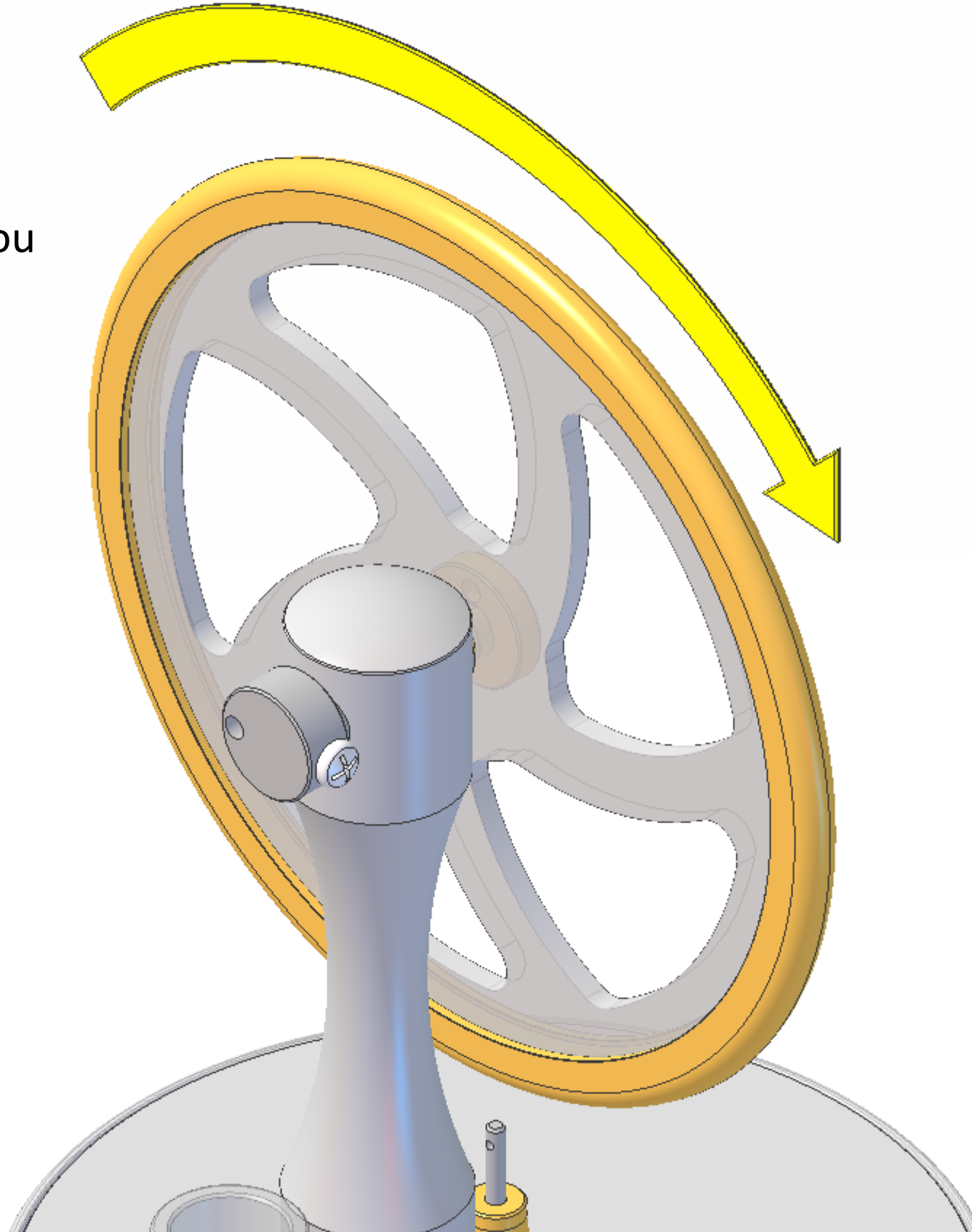


Gently push the flywheel back and forward, there should be a small amount of movement here. If there is not, slacken the crank screw, move the crank out a fraction and tighten. Make sure that when tightening the crank screw again it stays located on the small flat section on the axle.

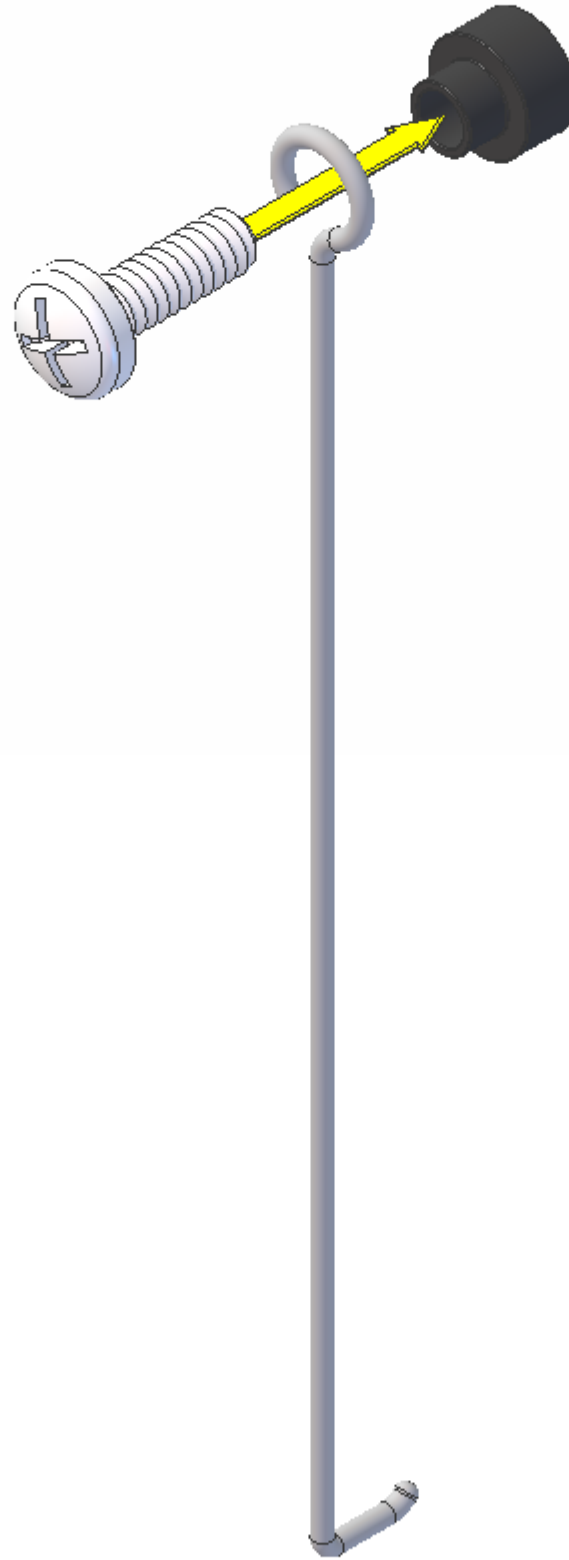


Give the flywheel a sharp spin, it should keep spinning for several minutes.

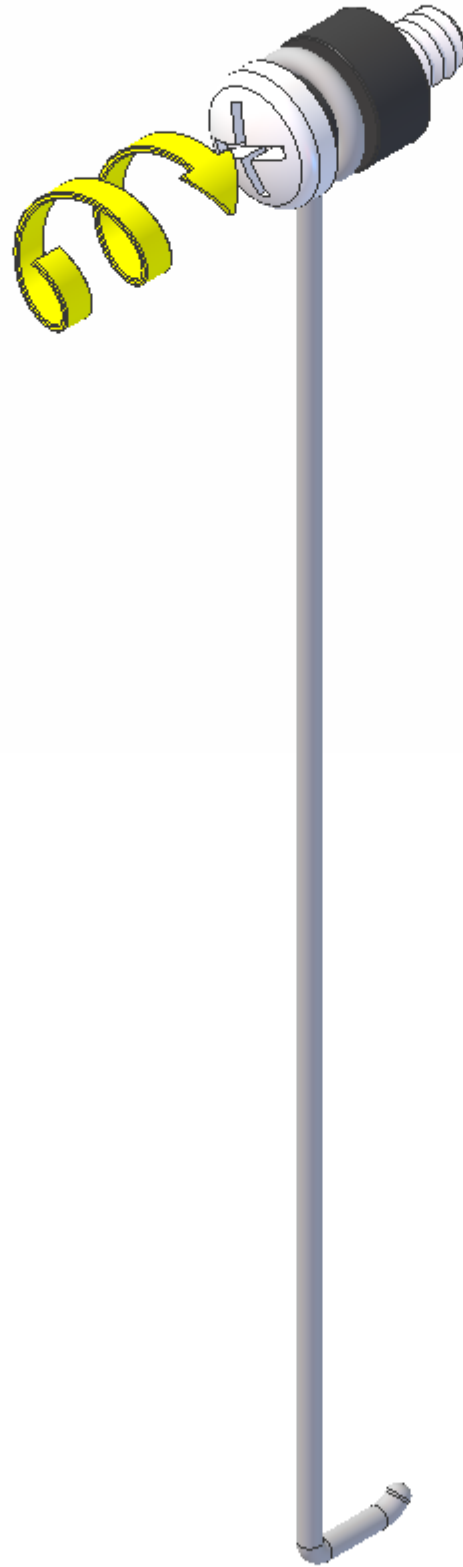
If it does not then you will need to go back and move the crank out a fraction more.

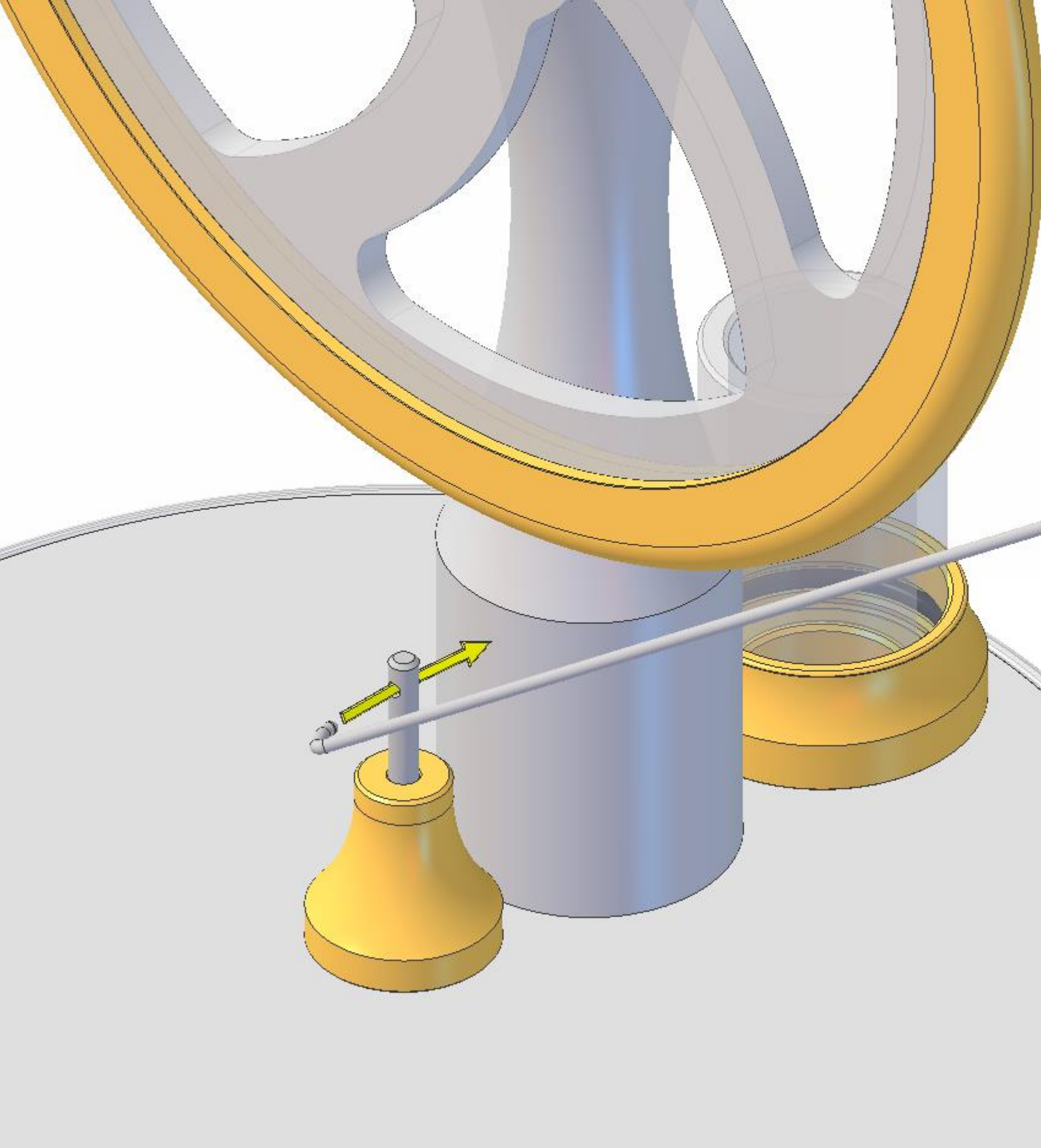


Fit one conrod onto one conrod bush and secure with one M2x6mm roundhead screw. The screw only needs screwing in a couple of turns at this stage. Note, the hook on the bottom of the conrod should be aligned as shown in the diagram.



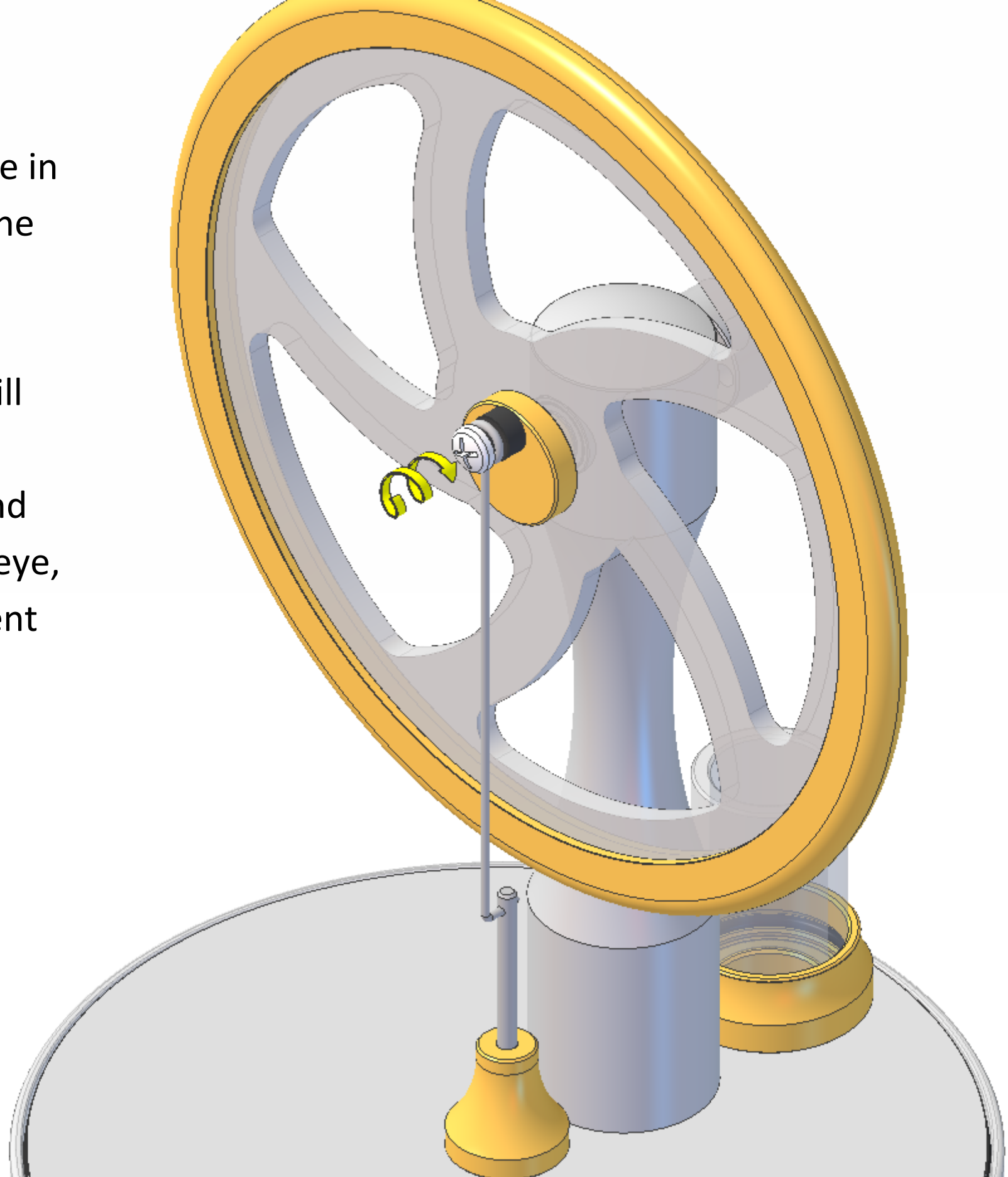
Screw the screw in until it just touches the bush.
Do not over-tighten or you could cause the bush to expand and pinch the conrod eye, which could prevent your engine from running.



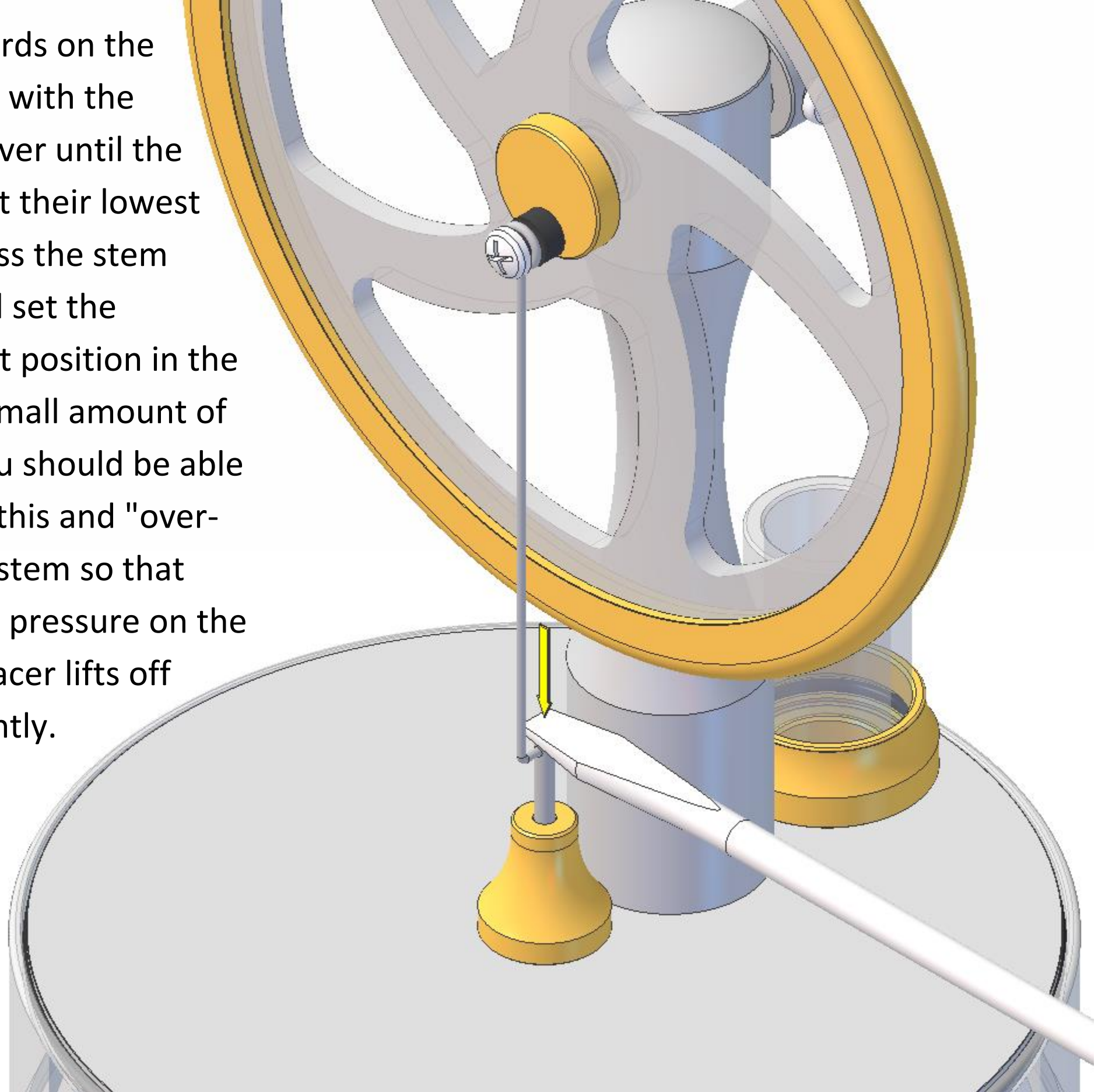


Fit the hook on the
conrod through the
hole in the top of the
gland stem.

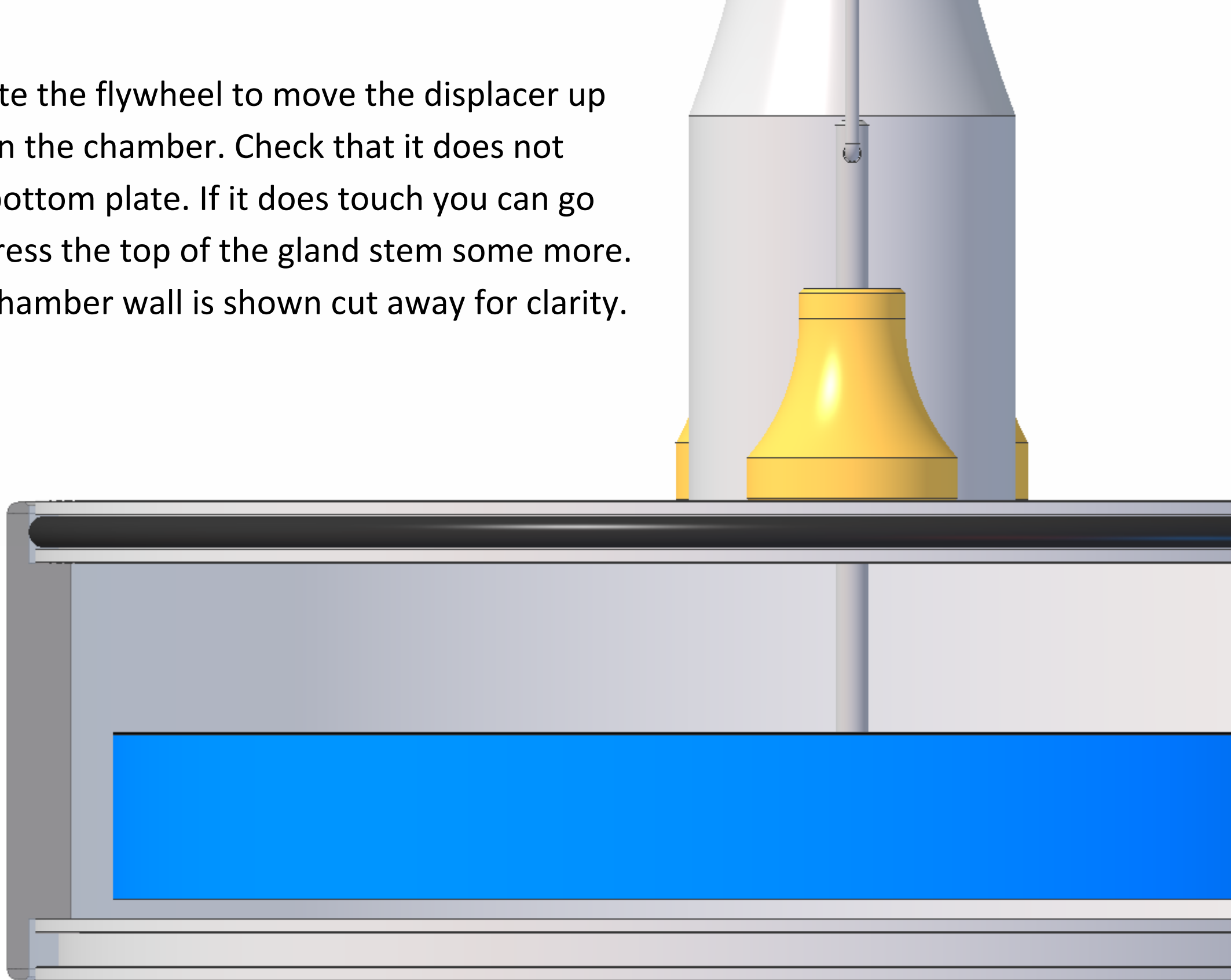
Screw the conrod screw into the hole in the front face of the hub. Tighten only sufficient to lock, over-tightening will cause the conrod bush to expand and pinch the conrod eye, which could prevent your engine from running.



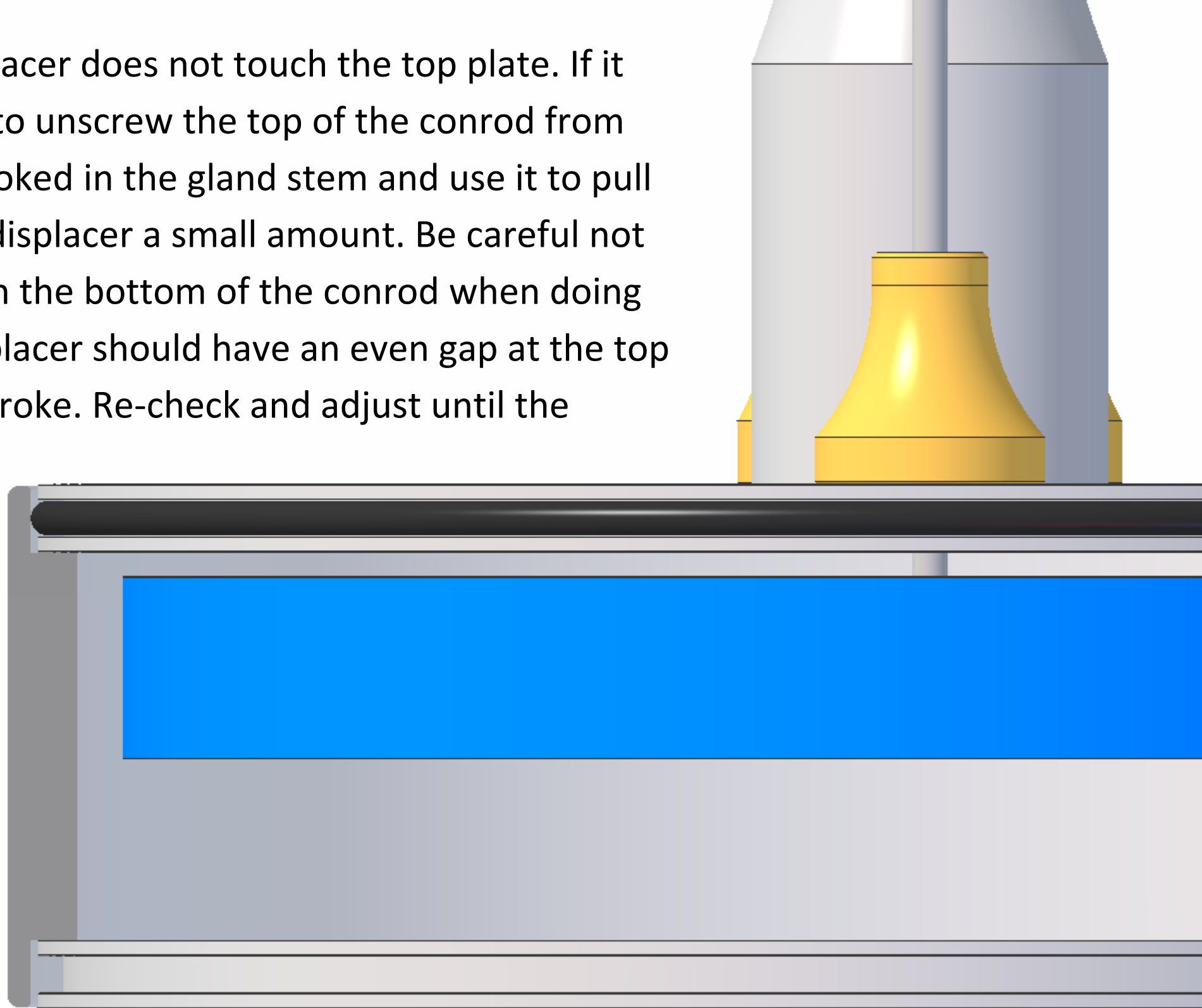
Gently press downwards on the top of the gland stem with the side of a flat screwdriver until the hub and conrod are at their lowest position. This will press the stem into the displacer and set the displacer to its correct position in the chamber. There is a small amount of flex in the conrod, you should be able to take advantage of this and "over-press" the top of the stem so that when you release the pressure on the screwdriver the displacer lifts off the bottom plate slightly.



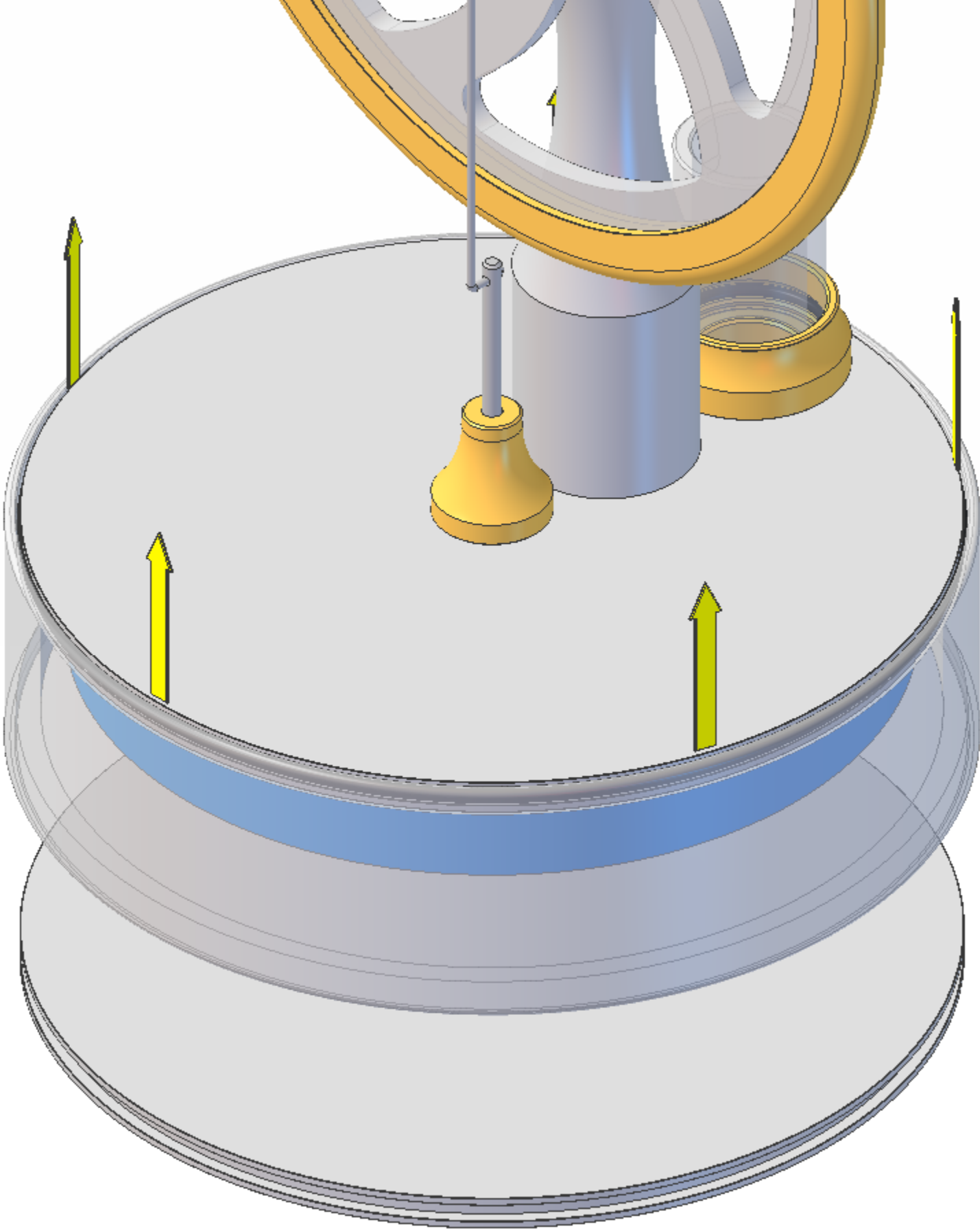
Slowly rotate the flywheel to move the displacer up and down in the chamber. Check that it does not touch the bottom plate. If it does touch you can go back and press the top of the gland stem some more. Note, the chamber wall is shown cut away for clarity.



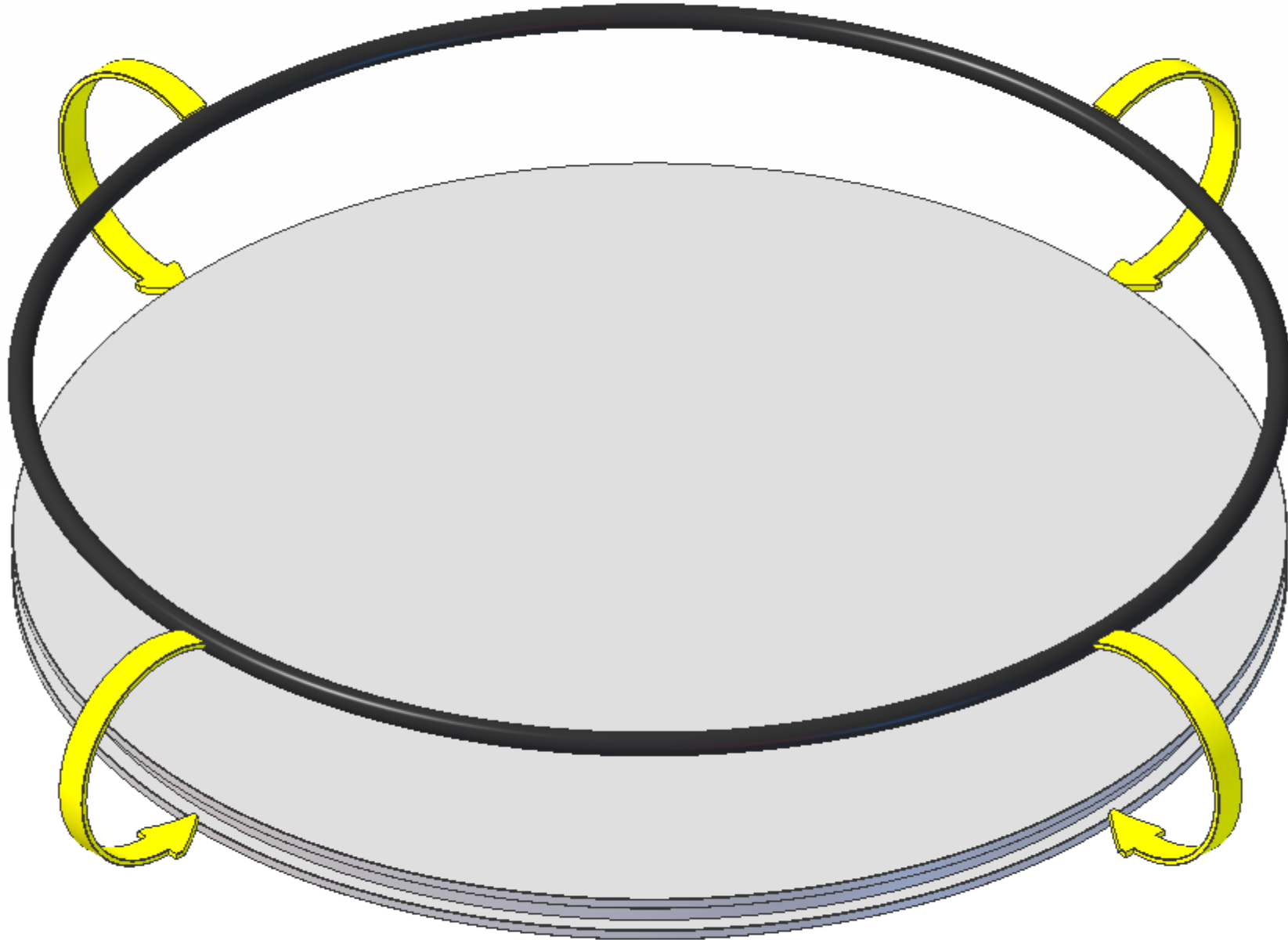
Check that the displacer does not touch the top plate. If it does you will need to unscrew the top of the conrod from the hub, leave it hooked in the gland stem and use it to pull the stem up in the displacer a small amount. Be careful not to bend the hook on the bottom of the conrod when doing this. Ideally the displacer should have an even gap at the top and bottom of its stroke. Re-check and adjust until the displacer does not touch either plate. Note, the chamber wall is shown cut away for clarity.



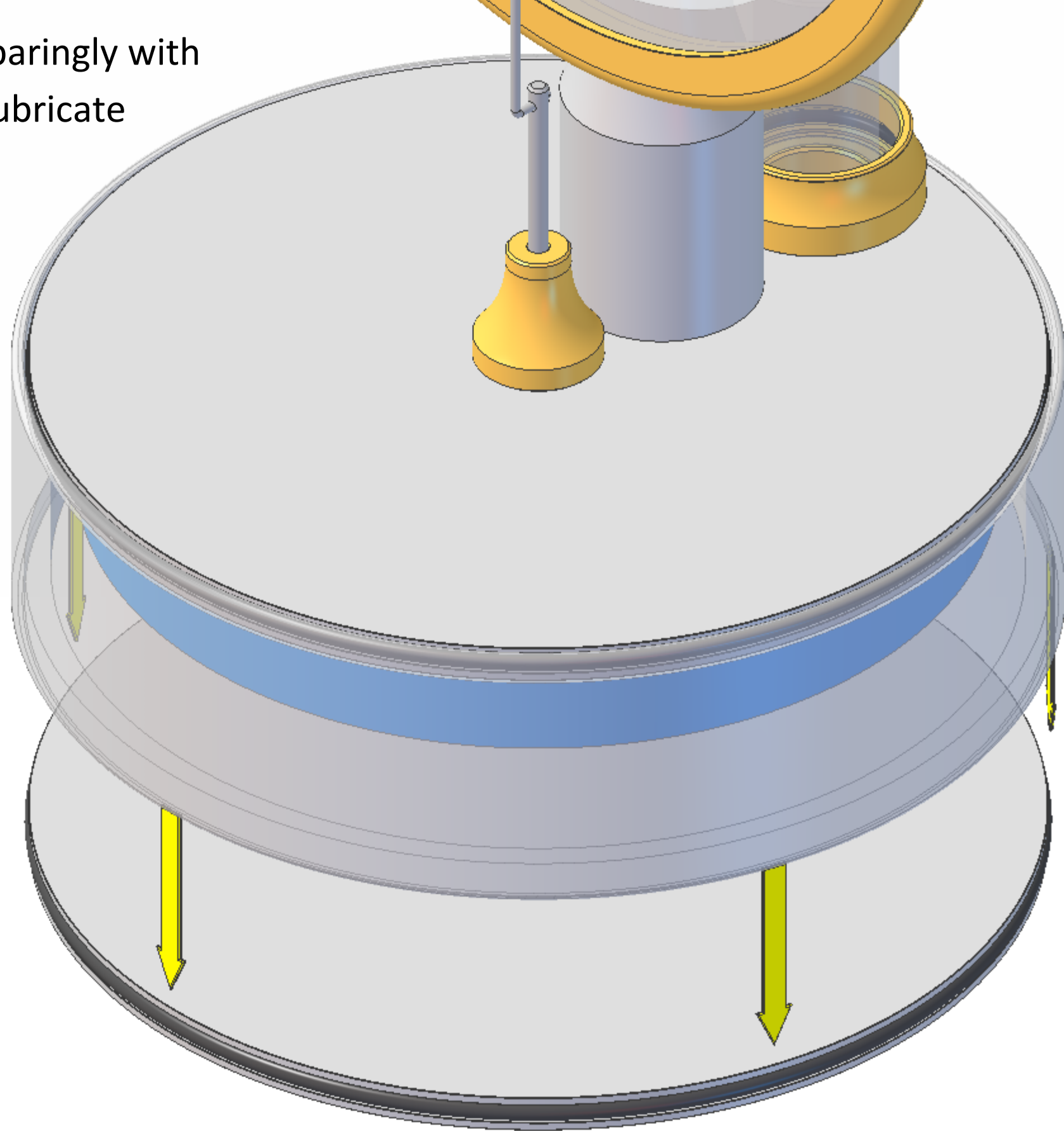
Lift the engine off
the bottom plate.



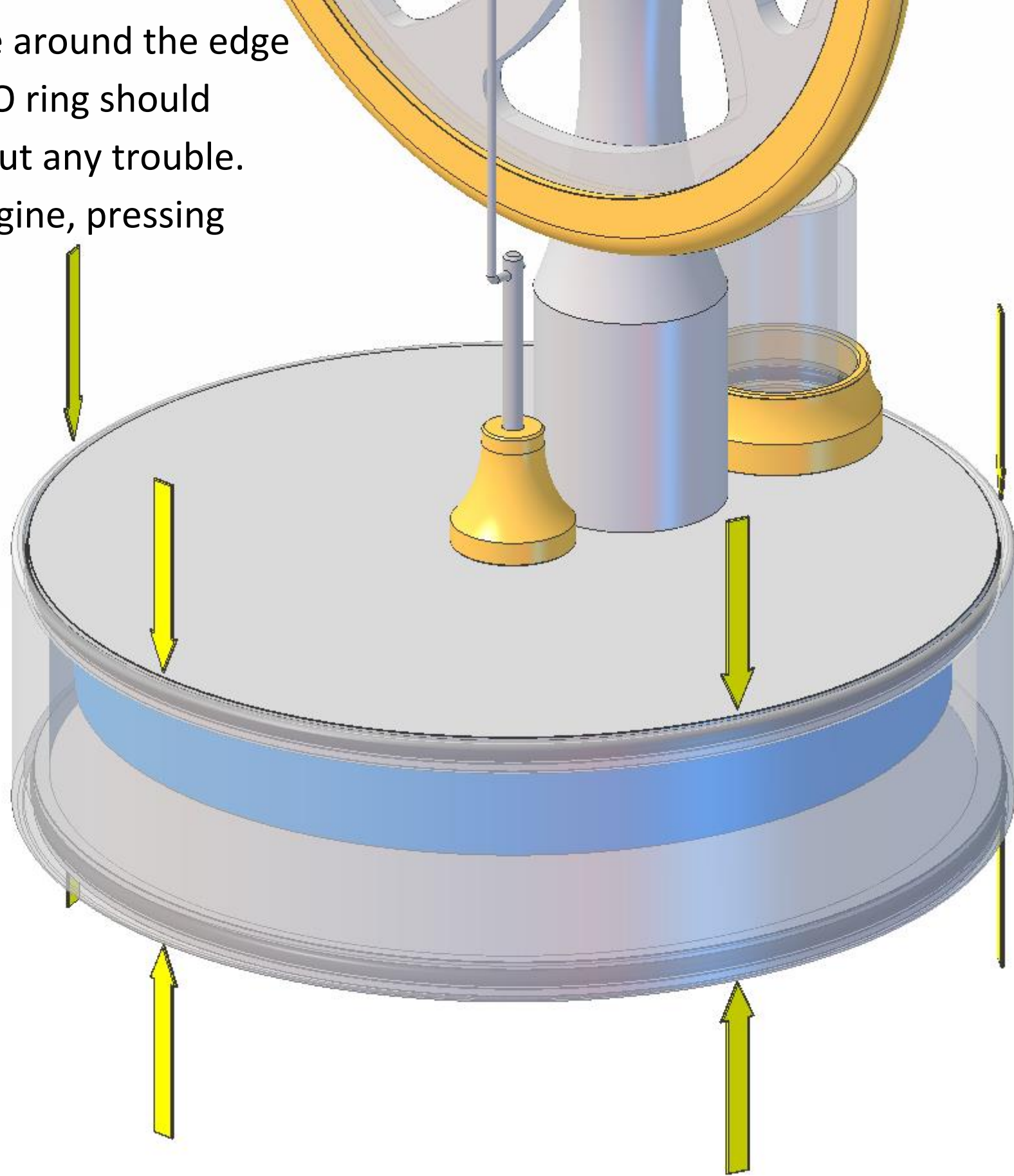
Fit one 75mm O ring into the groove in the edge of the bottom plate. It will need a slight stretch to get it over the edge of the plate.



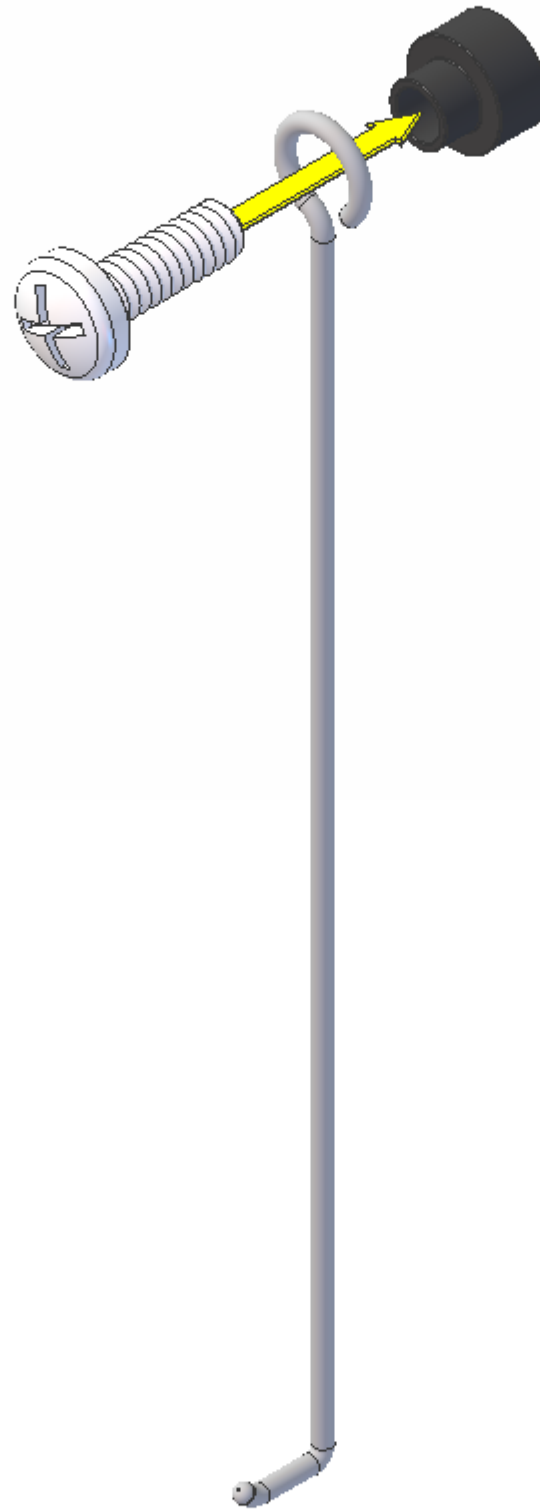
Moisten the 75mm O ring sparingly with slightly soapy tap water to lubricate it. Lay the bottom plate on your work surface and lower the engine onto it. The outer lip of the rebate on the bottom of the chamber wall should rest lightly on the O ring in the bottom plate.



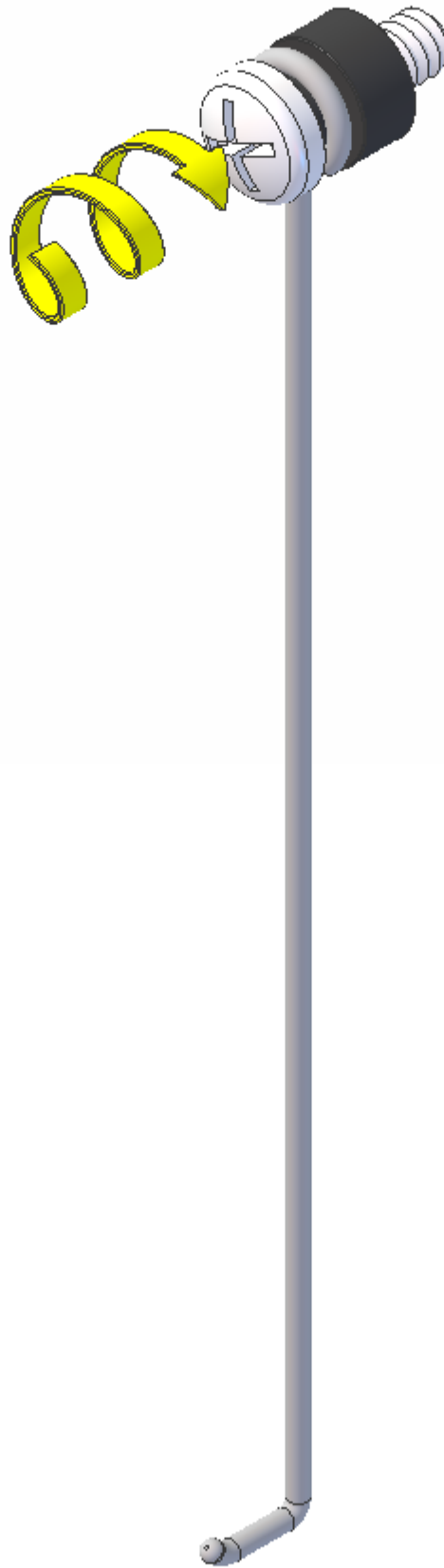
Apply gentle but firm pressure around the edge of the engine, the moistened O ring should squeeze into the rebate without any trouble. Work your way around the engine, pressing down as you go. The bottom plate should fit fully up into the the rebate without any bunching or pinching of the O ring. If the O ring appears bunched or pinched you will need to remove the plate & O ring and re-fit. If you have trouble pressing down on the engine you can lift the engine off your work surface and squeeze the plate into the engine.



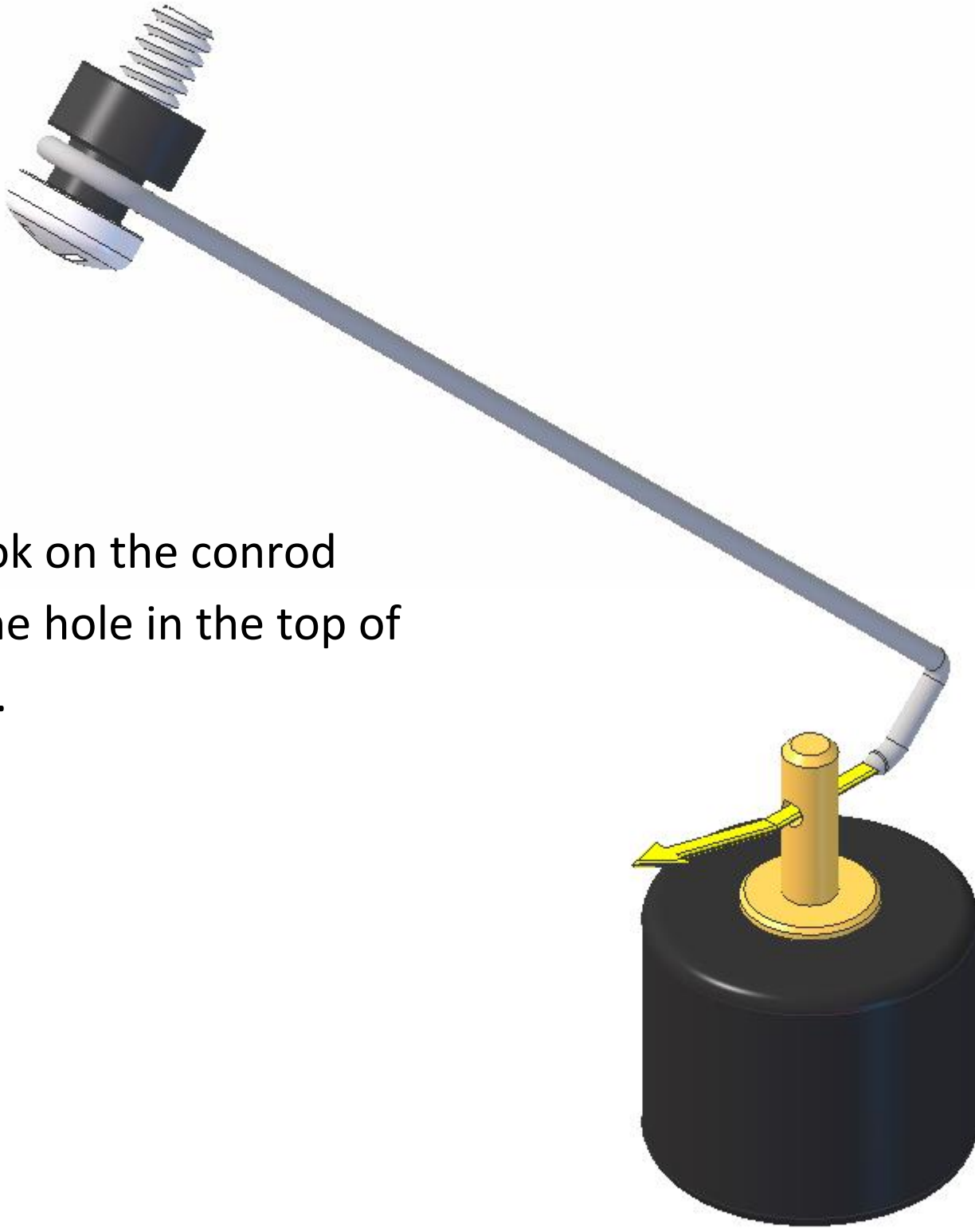
Fit one conrod onto one conrod bush and secure with one M2x6mm roundhead screw. The screw only needs screwing in a couple of turns at this stage. Note, the hook on the bottom of the conrod should be aligned as shown in the diagram.



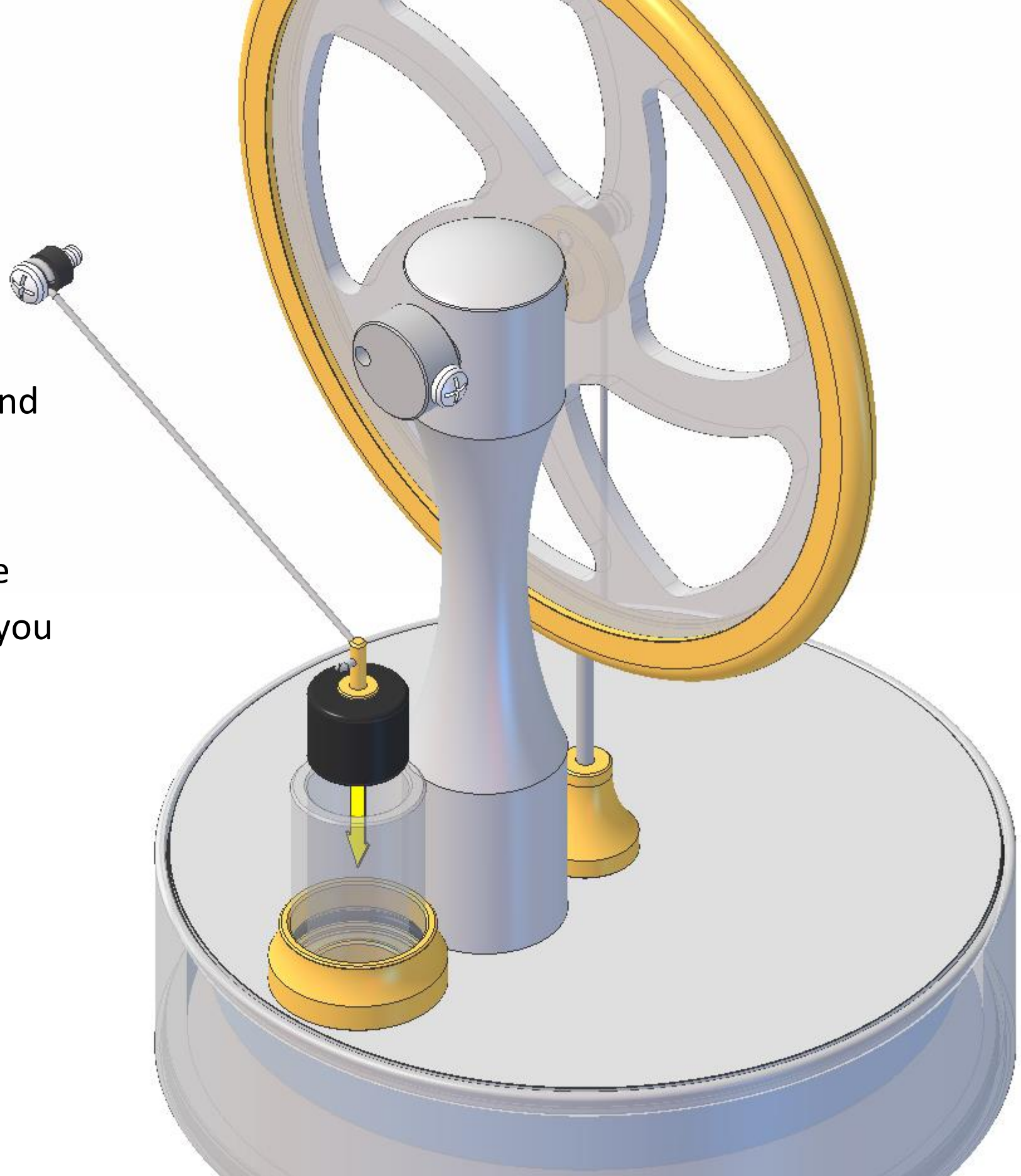
Screw the screw in until it just touches the bush. Do not over-tighten or you could cause the bush to expand and pinch the conrod eye, which could prevent your engine from running.



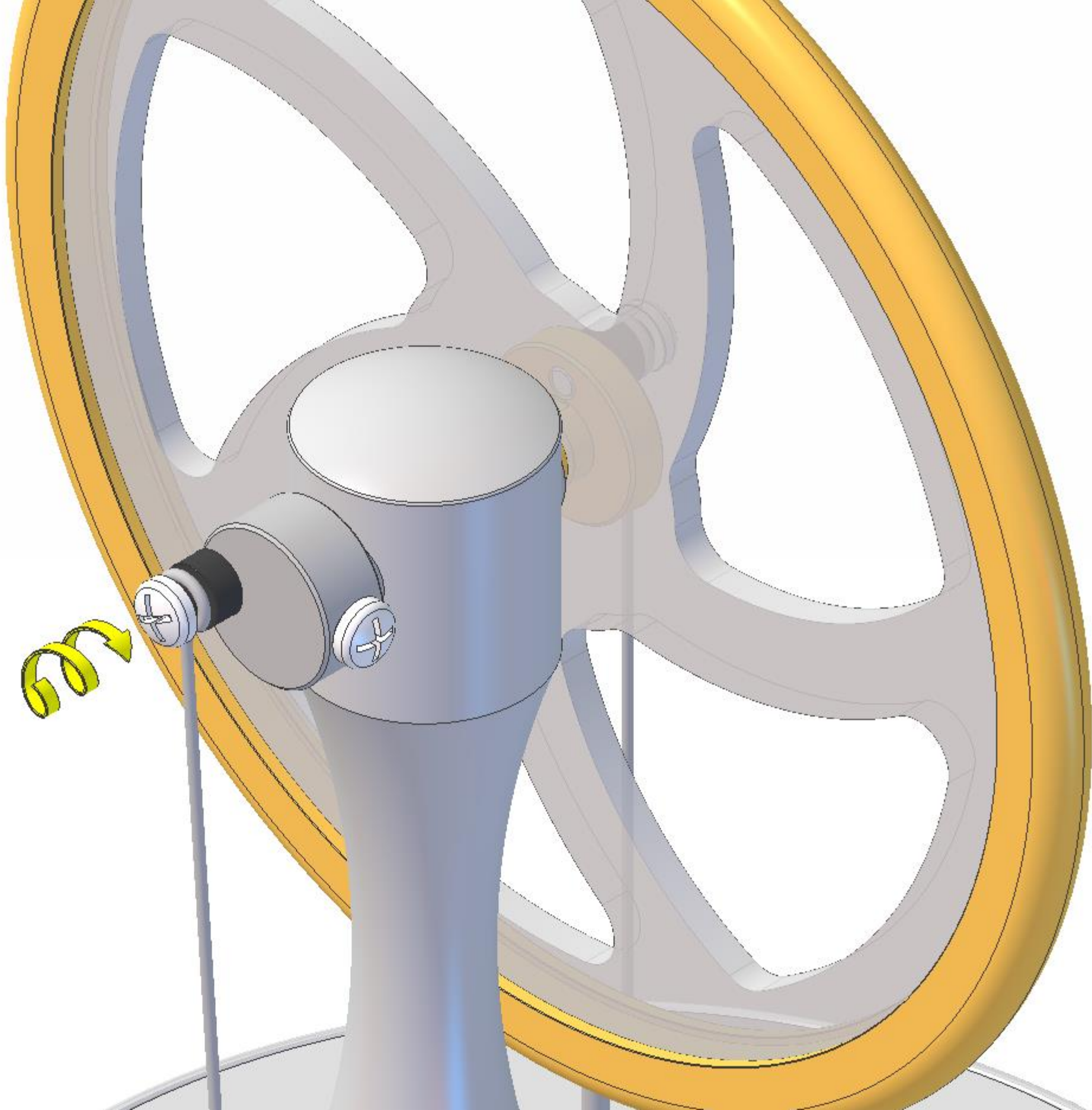
Fit the hook on the conrod through the hole in the top of the piston.



Slide the piston and conrod into the cylinder.
Some air pressure should be felt as you slide it in.



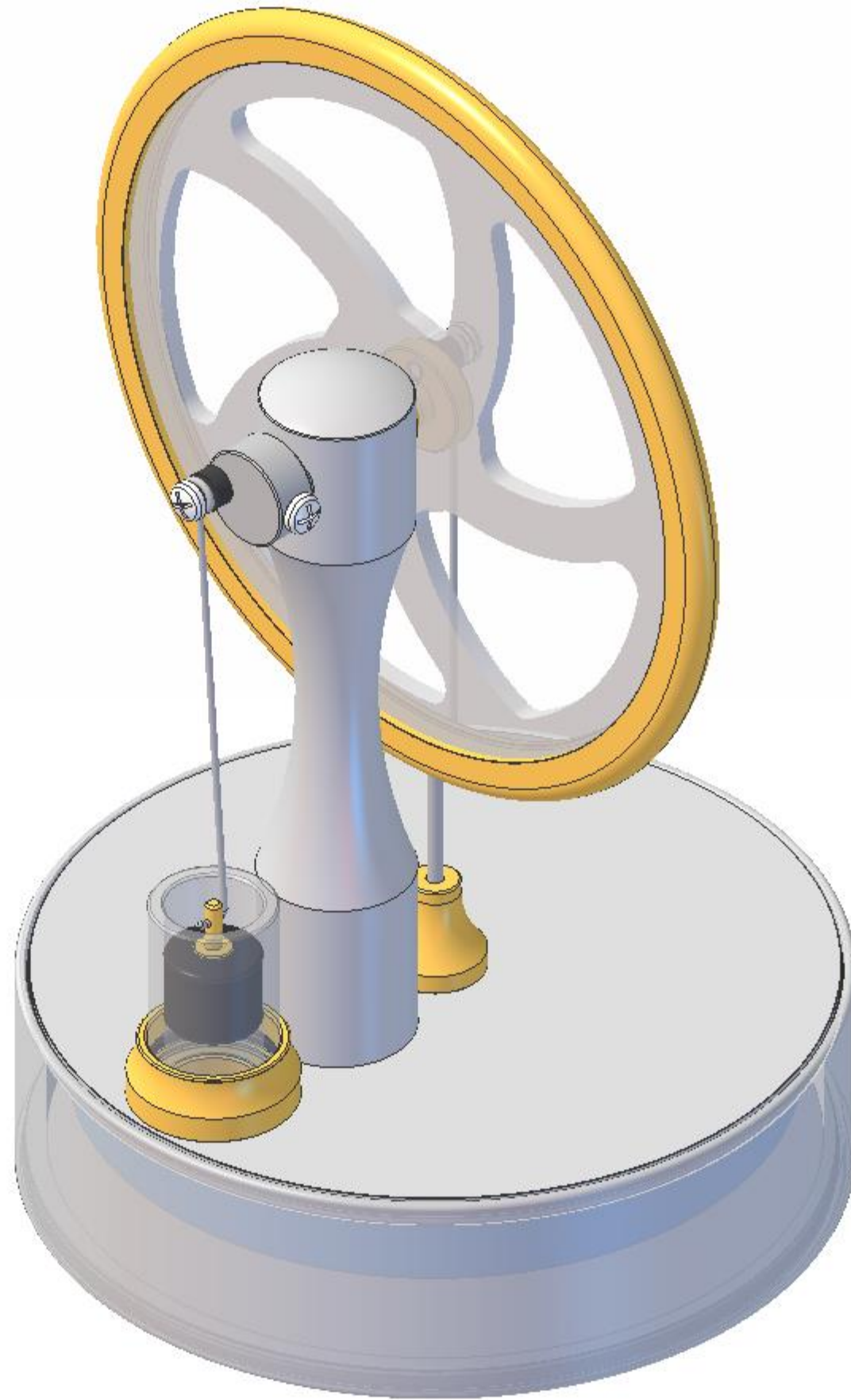
Screw the conrod screw into the hole in the front face of the hub. Tighten only sufficient to lock, over-tightening will cause the conrod bush to expand and pinch the conrod eye, which could prevent your engine from running.



Your engine is now fully assembled.

Check that the flywheel rotates fully, a small amount of resistance will be felt on rotation due to the air pressure inside the main chamber. Check the piston does not bump into the bottom of the cylinder and re-check the displacer does not bump into either plate.

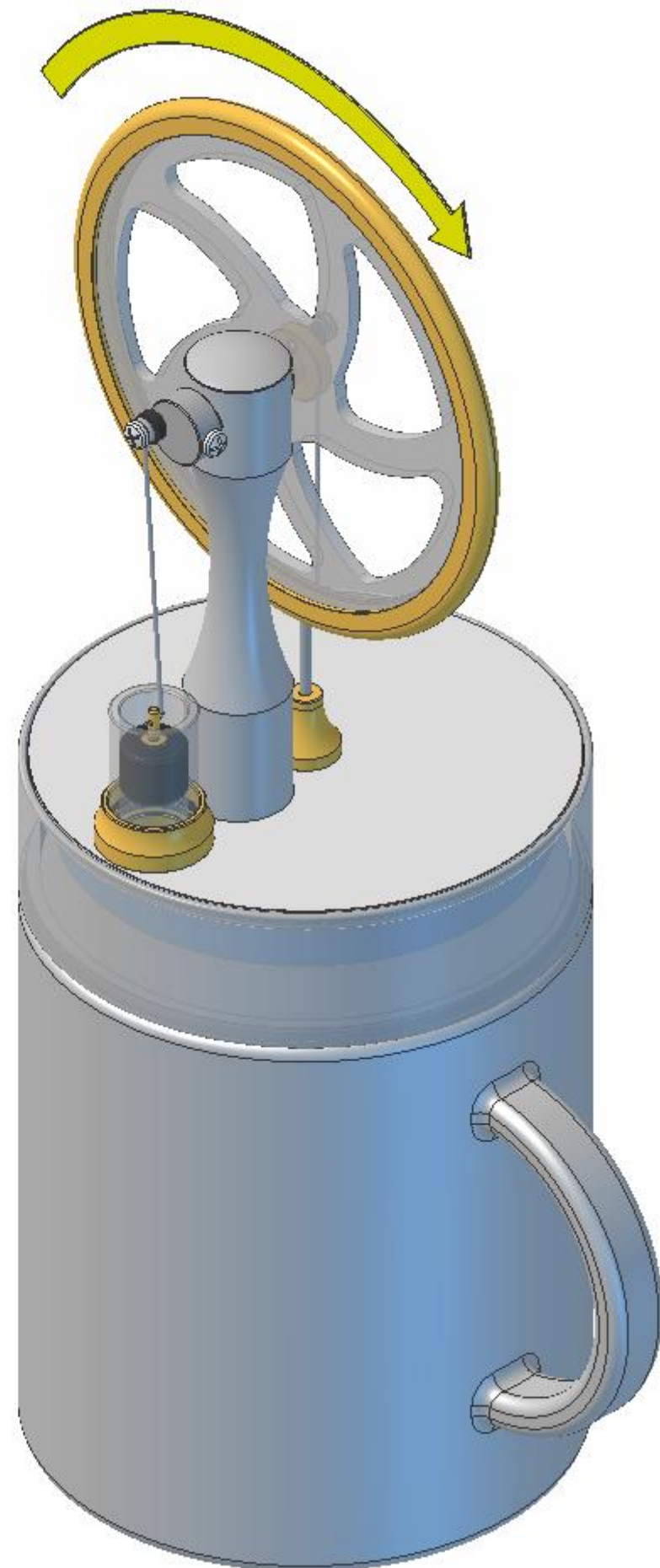
Once you have made these final checks you are ready to operate your engine.



The engine is not self-starting, you will need to give the flywheel a little spin to get it going. After the engine has been on your heat source for half a minute to a minute gently spin the wheel and it should carry on running.

The engine has been designed to run on hand heat, but will run equally as well from a wide variety of heat sources, including Digital TV box, adsl modem, table lamp, hot water - tea or coffee, warm sunlight.

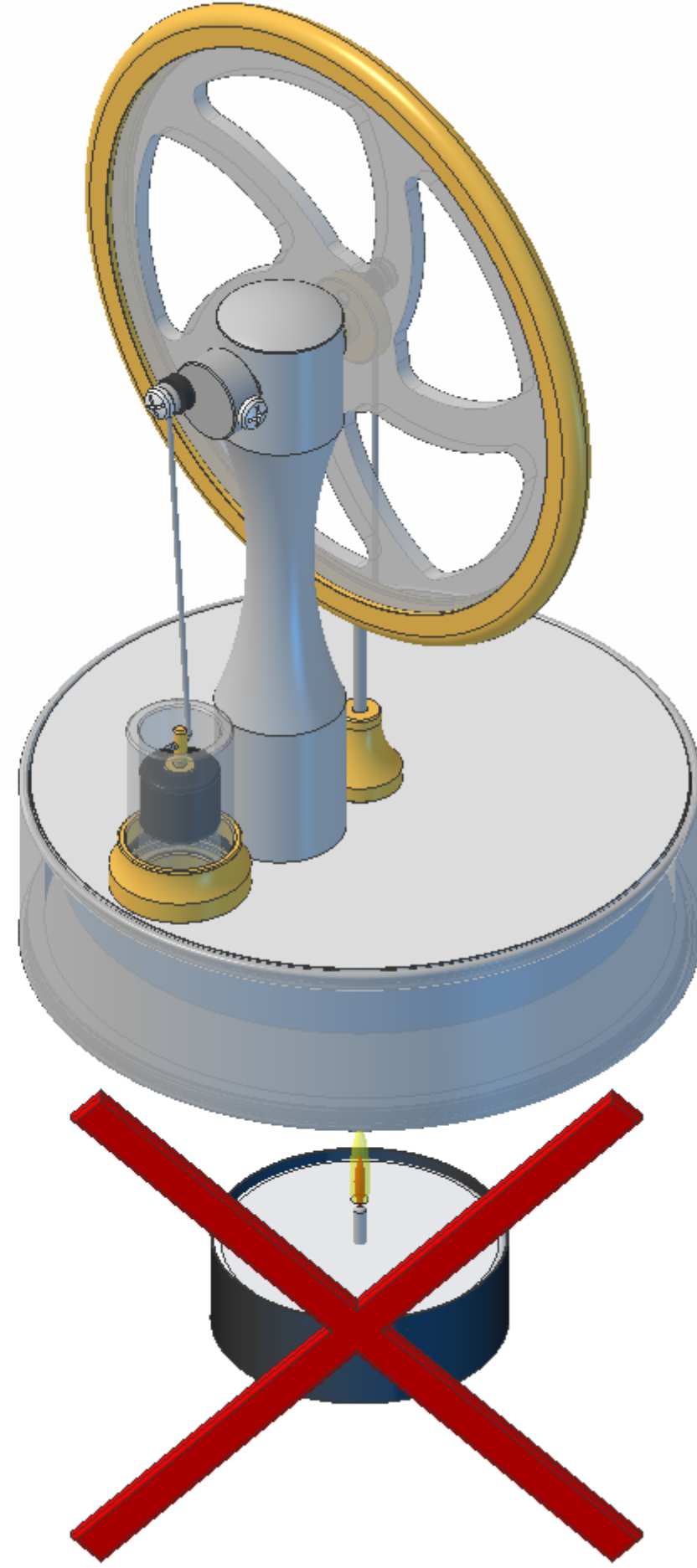
The engine will operate in reverse if you place it on a bowl of ice, this is because Stirling engines operate on a temperature difference, and it doesn't matter if the top plate is cool, as in conventional running, or the bottom plate is cool, as in ice running.



The engine only requires a very small temperature difference between the top and bottom plates to operate, anything hotter than hot water WILL damage it. DO NOT place it on any high temperature heat source (cooker, wood burning stove, candle etc.). This will melt a number of parts on the engine.

If you wish to operate your engine on hot coffee or tea you must allow the liquid to cool for a couple of minutes first.

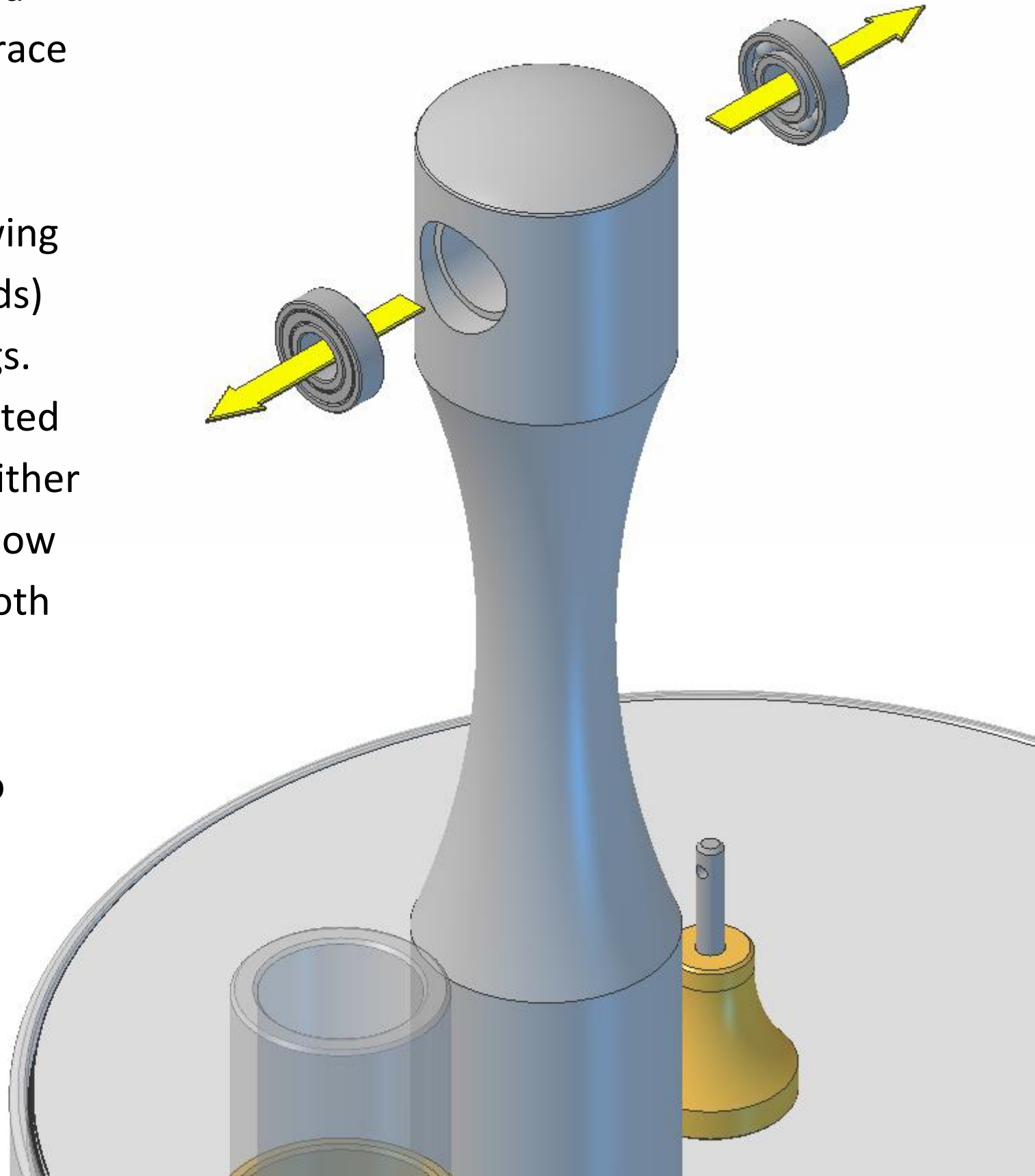
The hottest heat source that you should use for your KS80 engine must not be hotter than 75°C (167°F).



If your engine stops suddenly after a few revolutions the main axle ball-race bearings might need cleaning.

Disassemble your engine (by following the assembly instructions backwards) until you gain access to the bearings. Remove them and rinse in Methylated spirit or Denatured alcohol. Then either blow dry with compressed air or allow to dry naturally on an absorbent cloth or paper towel.

Follow the assembly instructions to reassemble your engine.

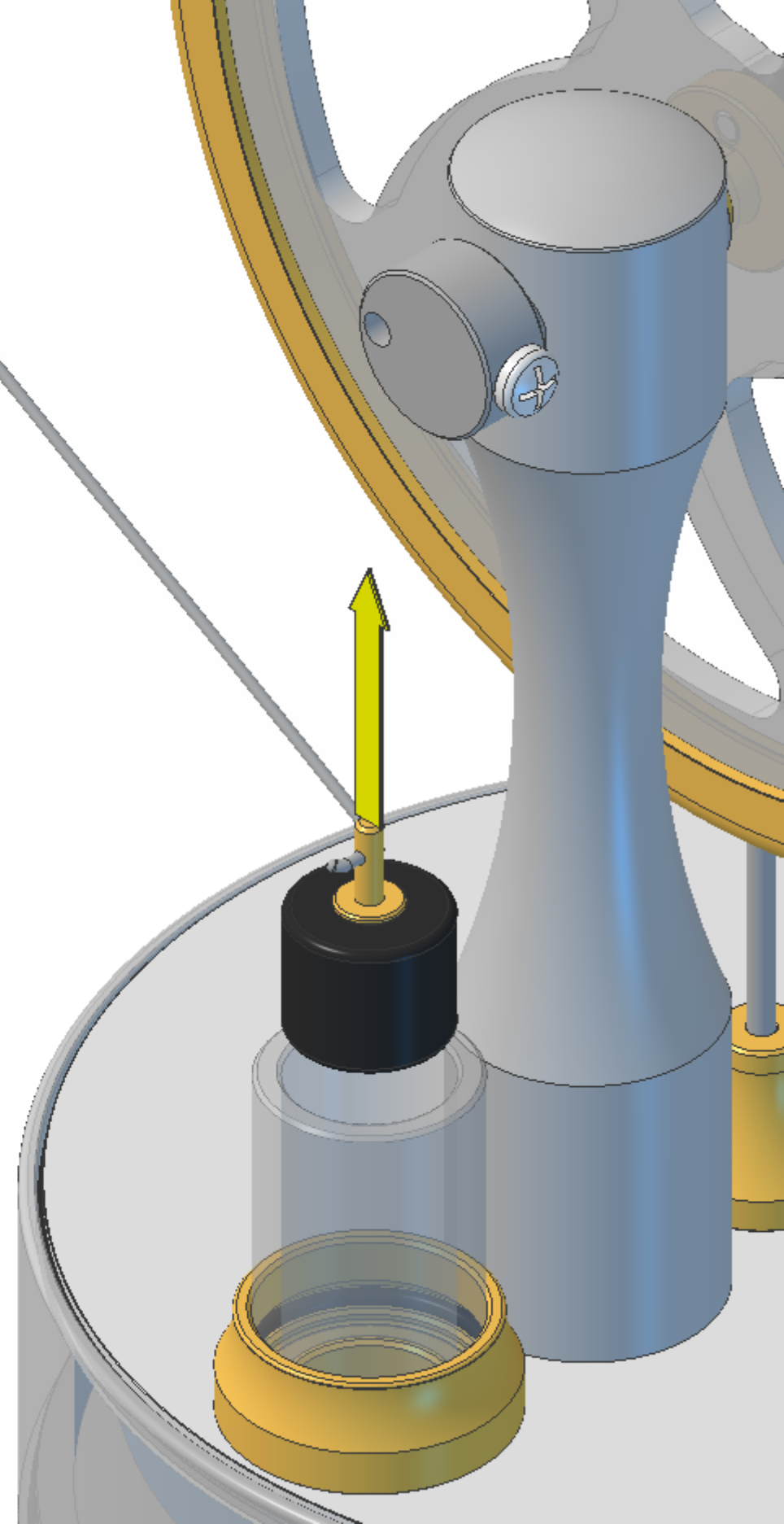


If your engine is running slower than usual you might need to clean the piston and cylinder.

Unscrew the conrod screw from the hub and slide the conrod and piston out of the cylinder.

Wipe the piston with a paper towel and clean the inside of the cylinder with a rolled up paper towel or cotton bud.

Make sure there are no stray fibres on the piston or in the cylinder and re-fit by sliding the piston into the cylinder (some air pressure will be felt, this is normal) and screwing the conrod screw into the hole in the face of the hub.



If your engine is running slower than usual you might need to clean the gland stem.

Rotate the flywheel until the displacer stem is at its highest point, and wipe the stem with a cloth.

Make sure there are no stray fibres from your cloth left on the stem.

